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1985 ANNUAL REPORT



THE U S NATIONAL ARBORETUM

Agricultural Research Service
United States Department of Agriculture

THE UNITED STATES NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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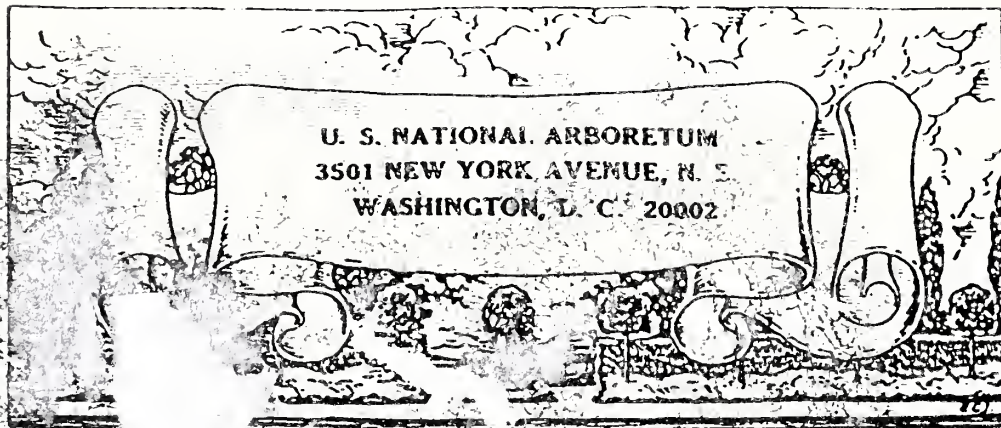
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The U.S. National Arboretum (USNA) was chartered by an Act of Congress in 1927 (Public Law 799, 69th Congress). The first roads, bridges, and water features were built between 1935 to 1940 by the Civilian Conservation Corp out of a setting of three dairy farms. The first director, B. Y. Morrison, was not appointed until 1951. The major plantings of azaleas, dogwoods, crabapples and daffodils were planted over the years from 1947 to 1958. The Volunteer Guide Service was established in 1958 in preparation for the official opening of the grounds to the public during the spring of 1959. Through the years new experiences were added: Hemerocallis (1960), peonies (1960), wild flowers (1960), dwarf conifers (1962), native azaleas (1970), Bonsai (1976), Iris (1977), Asian Valley (1979), Herbs (1980), Court-of-Honor, USNA Introductions (1982), Buckheister Bird Garden (1982), Allen Entrance to Bonsai (1983), National Country Garden (1984), and National Capitol Columns (1986).

Each of these gardens and collections were fitted into a landscape which also housed greenhouses (old range 1940), service buildings (1957), greenhouses (new range 1961), administration building (1963), and Information and Activities Center (1973). Various plans were proposed by the staff to combine education and research without disturbing the natural landscaping. Two Master Plans by Sasaki Associates, Inc. (1978), and Kidde Consultants, Inc. (1986) were funded by the Agricultural Research Service, USDA, to analyze all aspects of programs, facilities, personnel, and grounds to serve as a guide for REFINEMENT of the continuing development of the USNA into the 21st Century. It surveyed all the existing gardens, collections, and related facilities at the USNA and analyzed all aspects of the site, location, neighborhood, and traffic. It proposed how to REFINE AND INCREASE the effectiveness of the grounds to educate more and more people about the benefits of PLANT LIFE.

Wither Go'est the Ideal Arboretum?

(USNA answers to a questionnaire from the
Planning and Research Division, Shizuoka City, Japan)



VIEWPOINTS: Creation of an Arboretum/Botanic Garden

Essential Aspects:

1. Select a location with outstanding natural landscaping for the site;
Use nature as the basis of the design.
2. Utilize landscape architects and city planners to prepare the best use
and features of the grounds:

An international design competition--with a cash prize to the winner--
would involve many creative people in the process.

3. Organize plant societies to select a feature, or a garden, in which they will offer volunteer advice, help, and funds:

Every area of the space should have its champions to help in the continuing refinement of the facilities and experiences.

4. Provide a show case where all interested parties can stage shows, lectures, meetings, demonstrations to bring the public to highly visible events:

Corporate funding will come from staging events that will add to their public service image.

5. Create a program for students to work part-time on specially designed projects:

Locating new staff members can be easily accomplished by having a student-trainee program.

6. Encourage your leadership to visit other facilities to learn how they manage their programs:

There are many creative ways to manage an arboretum. Direct contact with other organizations always helps your managers focus into the most productive procedures.

7. Leave an area in your reception area that will be a constantly changing experience:

A Festival Area can be used as the feature to bring people to the area.

8. Avoid all elements of being a park:

Concentrate all of your efforts to horticultural and botanical experiences. Leave recreational experiences to other facilities.

9. Design a LOGO to be used on all signs, letters, and correspondence:

Easy recognition of the Arboretum is necessary to educate everyone that the arboretum exists and how to locate it.

10. Issue a series of publications and ideas that can be used to promote the presence of the arboretum in the nation:

A detailed map, poster, and guide book are essential tools to get across your stories.

11. Install a security system to protect all visitors:

Security guards, security fencing, and good visibility are essential to offer a safe experience for all visitors.

12. Add a special feature on the grounds of a relocated historic building to encourage the concepts of preservation:

A one-of-a-kind feature will help bring non-gardeners to your grounds. Any type of visitation which is controlled should help bring gardeners to your facilities.

13. Provide a living/LOGO memory from your gift/tea house/luncheon facilities:

Tourist facilities, including toilets and parking, are often forgotten in the creation of facilities. You must have a way to control crowds and to care for them.

14. Focus of all garden/collections should stress native plants:

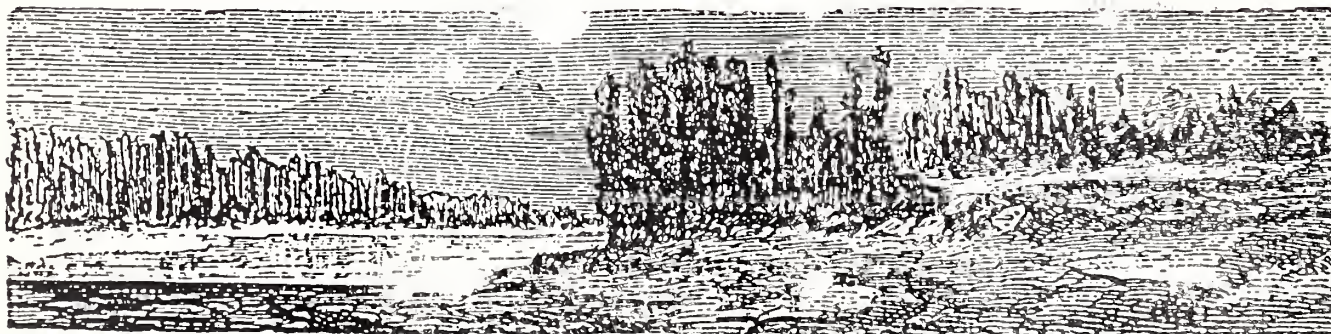
Exotic plants should be carefully introduced into the landscape in special areas which are well marked and identified. The stress should be the plants of the people.

15. Utilize a series of designers to create individual experience in the arboretum:

Visitors need to see the various approaches to good design.

16. Create an unified system of labeling, mapping, and history using the new computer generated software:

All aspects of the computer program should be easy to put into the system and to be retrieved.



QUESTIONNAIRE:

I. Questions Concerning Land Area Used:

1. What is the total area of the site on which your arboretum is located?

Land acquired over many years by the U.S. Department of Agriculture

a. History

1928	- First land purchase	189.0 acres
1934	- Second land purchase	196.0 acres
1938	- Third land purchase	9.7 acres
1948	- Fourth land purchase	14.0 acres
1949	- Fifth land purchase	6.0 acres
1959	- Land at Beltsville Agricultural Center (BARC-East)	150.0 acres
1977	- Brickyard purchased	30.0 acres
1984	- Second land at BARC-East	500.0 acres
Total: USNA (In the District of Columbia)		444.0 acres
(At BARC-East)		650.0 acres

b. Current Use: USNA in D.C.

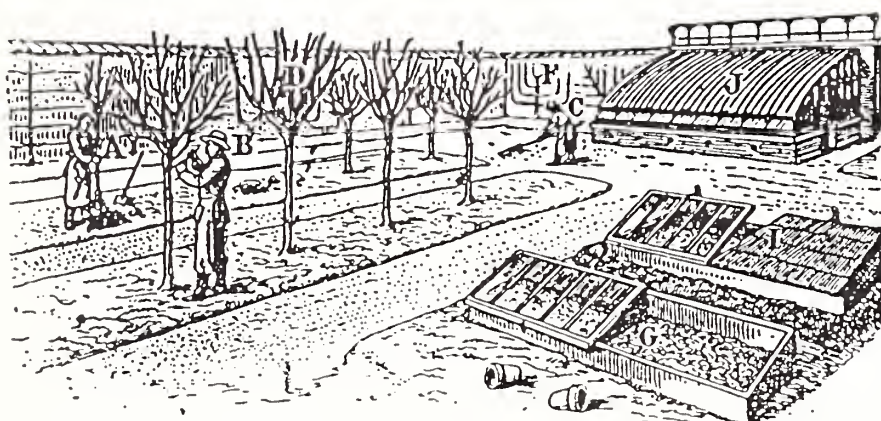
Gardens	30.81 acres
Collections	103.65 acres
Research	10.15 acres
Plantings	15.19 acres
Old nursery	2.90 acres
USNA at BARC-East	
Nursery plots (current and planned)	650.00 acres

2. How many hectares of the total area are devoted to preservation of natural vegetation? (1 hectare = 2.471 acres)

Almost 280 acres are devoted to the preservation of the natural vegetation including Eastern deciduous forests, streams, ponds, marsh lands, and bluffs. The land is crossed with 7 miles of paved roads and countless paths/trails.

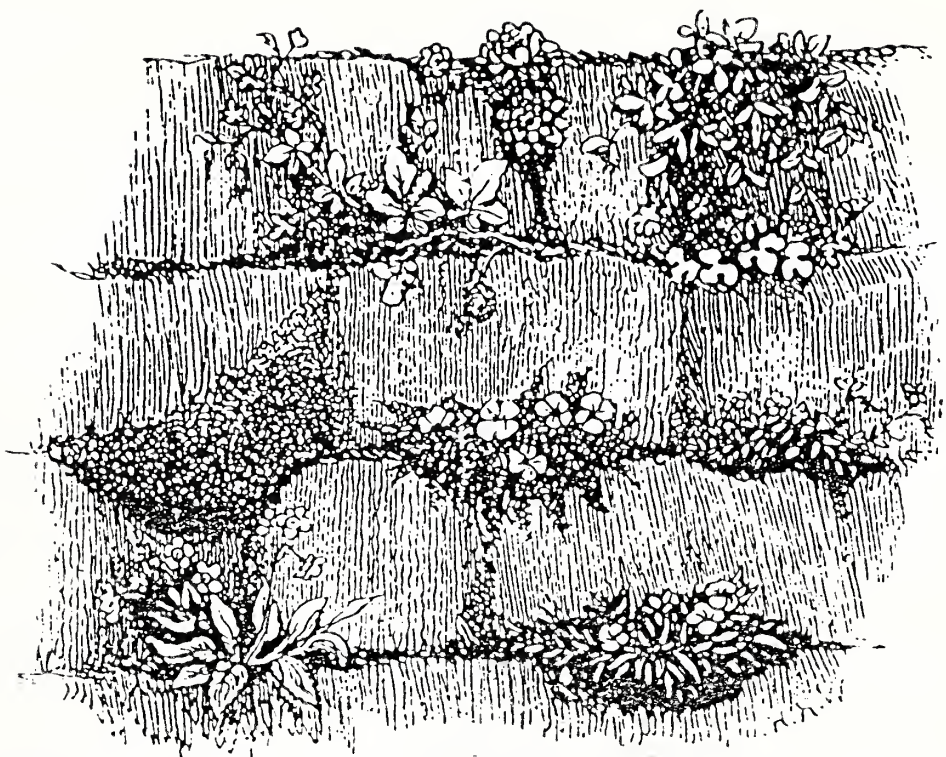
3. What kind of greenhouses, herbariums, laboratories and other such facilities does your arboretum have?
How much floor space does each of these facilities have?
What is the area of the plot on which each of these facilities are built?

The following table lists the types of usage and the aggregate square feet provided for the indicated functions. Most functions are housed in parts of more than one building.



Facilities: USNA

<u>Type of Usage</u>	<u>Square Feet</u>	<u>% of Total</u>
General Use (Halls, custodial closets, toilets, furnace room, other)	12900	14.2
Administration (Offices and supplies)	2100	2.3
Research (Offices, labs, greenhouse/ headhouse, library)	37000	40.9
Herbarium	8300	9.2
Gardens/Collections (Offices, drafting and label making rooms, dark room, headhouse/greenhouse, workrooms)	9200	10.2
Education (Offices, classroom, auditorium)	5500	6.1
Facilities (Shops, materials storage, work areas, boiler rooms, trades shops residence)	15500	17.1
TOTAL	90500	100.0



II. Questions Concerning Natural Environmental Conditions:

1. What is the elevation above sea-level at which your arboretum is located?

The topography ranges from 0 to 239 feet above sea level.

2. Do the geologic formations of the region in which your arboretum is located date back to the Paleozoic, Mesozoic or the third or fourth periods of the Cenozoic era?

The geologic formations date back to the Mesozoic Era.

3. Is the parent rock in the geologic formations of the region in which your arboretum located igneous, metamorphic or sedimentary?

The parent rock of the geologic formation is sedimentary.

4. Is the soil of the region in which your arboretum is located podzol, acidic or alkaline?

The soil is podzol and acidic.

5. How much rainfall does the region in which your botanical garden located receive?

The rainfall norm in 1961-1980 was 43 inches (109 cm) per year.

6. What are the highest and lowest temperatures of the region in which your arboretum is located?

Between 1946-1970, the highest atmospheric temperature was 104°F; the lowest was -1°F.

7. Between what months is the region in which your botanical garden is located subject to snowfall?

The U.S. National Arboretum may have snowfall anytime between November and March; rarely in April. At what time of year do the heaviest snowfalls occur? The heaviest snowfalls are February and March. About how many inches of snow accumulate during periods of heavy snowfall usually less than six inches, rarely 1 to 2 feet.

8. What is the number of sunny days per year in the region in which your arboretum is located?

There are about 100 clear days, 100 partly cloudy days and 165 cloudy days in Washington, D.C.

9. From what family are the species of vegetation that predominate in the region which your arboretum is located?

Most of the herbaceous species are in the Asteraceae and Rosaceae families; most of the woody plants are in Fagaceae family.

10. What types of vegetation have potential for natural growth in the region in which your arboretum is located?

Any plant adaptable to the temperate zone and the moderate rainfall has potential for natural growth in our region.

11. What are the water supply conditions in the area surrounding your arboretum?

There is a good municipal water supply from the Potomac River; the Anacostia River borders the Arboretum.

12. What are any exceptional scenic natural features in the area surrounding your arboretum?

Mt. Hamilton overlooks the Nation's Capitol; there are scenic overlooks to the Anacostia River.

13. For what reasons was the present site of your botanical garden selected?

The Arboretum site was selected because old farmland was available on a suitable topographic site.

III. Questions Concerning Geographic Conditions:

1. What is the name of the most central area in Washington? How many kilometers from this central area is your arboretum located?

The Mall is the central area of Washington. It is 3 kilometers from the Arboretum.

2. Is your arboretum linked to the city center by subway, bus or any other form of public transportation? If so, what types of public transportation are available? Bus and subway. How much time is required by each form of public transportation to reach your arboretum from the center of the city?

The city is linked by both bus and subway. From the center of the city to the Arboretum takes 60 to 75 minutes by bus and 30 to 60 minutes by subway and transfer to bus.

3. How much time is required to reach your arboretum from the center of the city by personal auto?

The trip takes 20-25 minutes by ordinary road and personal auto.

4. For reference, what was the population of Washington at the last census?

The 1983 population was 638,000 in Washington, D.C., and 3,370,000 in the metropolitan area.

5. Does the area surrounding your arboretum include any tourism or sightseeing locations?

If so, please describe. All of the historic and cultural attractions of downtown Washington are reasonably close, although none are in the adjoining or very close surrounding area.

6. Does the area surrounding your arboretum include any large-scale research facilities or industry? If so, please describe.

We do not have large scale research facilities or industry in the immediate area.

7. Is the area in which your arboretum is located subject to legal regulation for the purpose of nature conservation? If so, please describe the contents of such legislation.

Rare and endangered species (native plants) are protected by legislation. Structures are protected by the Fine Arts Commission.

IV. Questions Concerning Types of Plants on Display

1. How many types of plants do you have on display? Please indicate the number of families, genera and species.
2. Of the types of plants above, how many families, genera and species of gymnosperm spermatophyta do you have on display?
3. Of the types of plants above, how many families, genera and species of angiosperm spermatophyta do you have on display?
4. Of the types of plants above, how many families, genera and species of ferns do you have on display?
5. What is the principal method of displaying plants? Are displays grouped by taxonomy, geography, ecology, heredity or usage?

(The figures in the following table are approximate numbers for our major collections)

Garden/Collection	Display Method	Number of Plants			
		Total	Gymnosperms	Angiosperms	Ferns
Asian Valley (plants of Asian origin)	Geography and ecology in a landscape setting overlooking river	600	4 families 13 genera 20 species	75 families 90 genera 500 species	3 families 6 genera 8 species
The National Herb Garden (Plants with herbal use plus historic roses)	A landscape setting	1000	2 families 4 genera 6 species	26 families 190 genera 580 species	2 families 2 genera 6 species
Fern Valley (Plants native to Mid-Atlantic United States)	Geography and ecology in a natural landscape	1300	3 families 7 genera 15 species	112 families 313 genera 650 species	8 families 22 genera 48 species
Conifer Collection (Broad range of landscape conifer species and cultivars)	A landscape setting	Uncounted	3 families 25 genera 107 species 515 cultivars	None	None

IV. Continued

National Bonsai Collection	Bonsai display pavilion	55	5 families 9 genera 12 species	13 families 17 genera 19 species	None
Japanese Garden	As Japanese Garden	165	4 families 5 genera 7 species	38 families 80 genera 130 species	8 families 12 genera 15 species
Yucca, Hemerocallis, Iris and Aeonium Collections	A landscape setting	Uncounted	None	4 families 4 genera 100 species 530 cultivars	None
Ilex and Magnolia Collections	A landscape setting	Uncounted	None	2 families 3 genera 24 species 670 cultivars	None
Rhododendron (Azalea) Collection	A landscape setting	Uncounted	None	1 family 20 genera 250 species 1170 cultivars 70 species hybrid	None
Narcissus and Hedera Collection	A natural woodland setting	Uncounted	None	2 families 2 genera 24 species 670 cultivars	None
Mrs. Francis King Dogwood Planting	A landscape setting overlooking river	Uncounted	None	1 family 1 genus 8 species 22 cultivars	None

There are also a number of collections grouped in less defined landscape settings: Acer - 22 species,
119 cultivars; Malus - 25 species, 210 cultivars; Prunus - 25 species, 69 cultivars; Salix - 30 species,
20 cultivars

IV. Questions Concerning Plants on Display and Research Performed:

6. What is the field of research in which your botanical garden is most involved? Please explain briefly.

The United States National Arboretum is heavily involved in research on landscape trees and shrubs and the taxonomy of woody plants.

7. Has research at your arboretum produced any unique or exceptional findings? Please explain briefly.

The research program has produced basic findings in wound compartmentalization and statistical analysis of plant breeding data in addition to nearly 100 new variety releases of shrubs and trees.

8. Has research at your arboretum produced any results that are currently being applied in practical use? Please explain briefly.

Almost all the released varieties are still sold and utilized in the nursery industry.

9. What kind of research system does your arboretum support? How many researchers are organized in what way to perform research in what fields?

Five research scientists--two geneticists, two botanists, a horticulturist, six support scientists, a plant propagator, and greenhouse, clerical, and technician-support function under the leadership of a Research Leader.

10. Is your arboretum involved in research in any new fields, such as biotechnology or genetic engineering? If so, how many teams and researchers work on such projects? What are your expectations for the future in these areas?

There is some effort in tissue culture leading to bioengineering as part of other programs. We plan to increase effort in this area with the addition of a plant physiologist to the staff.

11. Does your arboretum have any affiliated organizations such as research facilities or educational centers? If so, please indicate the name and nature of such organizations and the number of staff or researchers employed there.

We have no formal affiliations but several large universities in the area provide sources of training and expertise as well as student employment help.

12. Does your arboretum provide housing for its researchers and staff? If so, please indicate where and in what kind of area such housing is located, the size of one housing unit and the total number of units. If not, in what kind of area do your staff and researchers reside, and what methods of transportation do they use to commute to your arboretum?

On-site housing is available for the facilities/maintenance manager. The rest of the staff, of about 80, utilizes housing in many sections of the metropolitan Washington area. Bus and subway is available, but almost all employees usually commute by private automobile.

13. Does your arboretum sponsor any educational programs or activities you consider to be unique or exceptional?

The most unique and exceptional Arboretum programs were the two international seed exchanges involving young school children as the primary seed collectors. In the first case, about 1 million United States dogwood (Cornus florida seeds) were exchanged for a like number of Japanese flowering cherry seeds. The second exchange was United States Sugar Maple Seed for Union Soviet Socialist Republics cold hardy crabapple seed.

V. Questions Concerning Exchanges of Researchers:

1. Does your arboretum employ a system that permits researchers from other research organizations, universities or botanical gardens to use your research facilities.

Mechanisms exist to have other researchers study at the United States National Arboretum. However, financial constraints dictate that such researchers must provide their own funds.

Most recently, Professors He Shan-an, and Zhang Ao-lou from the People's Republic of China and Professor Robert Brooks from New Zealand have studied at the U.S. National Arboretum. Professor Zou Shou-qing, PRC and Professor Brooks are expected for part of 1986.

1981-1982 - Professor He Shan-an, Director of Jiangsu Institute of Botany, Nanjing, PRC.

1981-1982 - Professor Zhang Ao-lou; Deputy Director Kunming, Yunnan Province, PRC.

1984-1986 - Professor Robert Brooks, Chairman, Dept. of Chemistry and Biophysics, Massey University, New Zealand.

1986 - Professor Zou Shou-qing, Deputy Director, Yunnan Institute of Tropical Botany, Academic Sinica, Mengla, Yunnan Province, PRC.

2. Inversely, do researchers from your arboretum have the opportunity to conduct research in the facilities of any other organization for long periods of time?

There have been procedures for permitting ARS researchers to study in other organizations, but the Arboretum scientists have not found it possible to do so.

VI. Questions Concerning the Protection and Care of Plants:

1. Please describe the system for caring for protecting and nurturing plants at your arboretum. Also, please detail the systems used for caring for and nurturing vegetation. We are especially interested in information concerning methods for care of natural vegetation.

Each major unit area is under the supervision of a curator. The care plants receive in each of these unit areas varies greatly depending on the plant material in the area. For example, the care required for the plants in the Japanese Garden is much more intensive than for those in our Acer collection. The Bonsai Collection requires the highest level of care. Basically we try to provide the required cultural requirements; i.e., fertilizer, water, insect and disease protection, and pruning for the plants we grow. We provide almost no care for our natural vegetation.

2. We provide no special care for plants in our permanent Gardens and collections during the winter season.

If we have a heavy wet snowfall, we remove snow from the branches of conifers and broad leaved evergreens to prevent branch breakage.

VII. Questions Concerning Management:

1. Is the organization that established your botanical garden a branch of the national or local government? Was your arboretum established by a private organization? The Arboretum was established by the United States Government.

Current Structure:

Secretary of Agriculture: John R. Block until February 1986
Richard Lying - Pending

Science and Education : Assistant Secretary
Dr. Orville G. Bentley

Agricultural Research Service: Administrator
Dr. T. B. Kinney, Jr.

Beltsville Area: Beltsville Agricultural Research Center
Director, Dr. W. Klassen

U.S. National Arboretum : Director
Dr. H. M. Cathey

2. Please describe the management system at your botanical garden including such details as the arrangements of posts within the managerial system and the number of people employed at these posts.

a. As of November 22, 1985	<u>Number of People</u>
Administrative Unit	7.0
Research Unit	22.0
Garden/Collections Unit	14.0
Students (half-time)	5.0
Fellows (FONA)	<u>2.0</u>
Total	21.0
Facilities Unit	23.0
Education Unit	4.0
Library (National Agricultural Library)	<u>1.0</u>
	78.0
b. On Contracts (not USNA employees)	
Security Guards (3 shifts)	8.0
Janitorial Services	<u>5.0</u>
	13.0
c. Volunteers:	
Guides	50.0
Aids	<u>25.0</u>
	75.0

3. About how much are the total yearly expenses incurred in maintaining your arboretum? Of that total, how much goes into research? What sources of funding are used to cover these costs?

- a. Budget: Information in detail is not generally distributed.

Base funds total is approximately: \$3.7 Million

- b. Sources: Appropriations by the U.S. Congress

Contributions through Friends of the National Arboretum (FONA) for activities that cannot be funded by the Federal Government.

4. How much is the admission charge per person at your arboretum?

Public facility funded by the U.S. taxpayers; all events are open to the public free-of-admission.

5. How many people visit your arboretum yearly? Of the total, how many visitors come from overseas? How many visitors come from Washington or the surrounding area?

We have no accurate numbers about our visitors. Since we are open 8:00 a.m. to 5:00 p.m. daily every day in the year, except Christmas Day, we have many uncounted visitors. We estimate one million visitors per year and our visitation is steadily rising.

6. Do you have any recommendations about managing a botanical garden based on experience managing your arboretum?

We propose for the development of the USNA:

- o CREATE - The museum about plants for North America
 - (1) INDOORS - ALL WEATHER EXPERIENCES
 - (2) OUTDOORS - A TRAM RIDE TO THE 444 ACRE GARDEN
- o EXPLORE - The research facility to search, breed, select and introduce woody plants for the landscapes of North America
 - (1) Collections: GENETIC DIVERSITY OF LANDSCAPE PLANTS
 - (2) Genetics : HI-TECH TO INTRODUCE SCIENCES
HIGH PERFORMANCE PLANTS
- o DISCOVER - Display the recent achievements of American Agriculture
 - (1) Technology: IMPACT OF RESEARCH ON THE LIFE OF NORTH AMERICANS
 - (2) Educational events: THE PLACE WHERE THE KNOWLEDGE CAN BE EXPERIENCED
- o FESTIVAL SETTING - The place in Washington to see beautiful landscape plants
 - (1) Seasonal Displays: DAZZLING PLANTS, COLORS, AND DESIGNS TO INSPIRE ALL VISITORS
 - (2) Showcase: COOPERATING ORGANIZATION PRESENT NATIONAL SHOWS
- o MASTER PLAN - U.S. National Arboretum (in outline form)
 - (1) Objective: A WORLD CLASS FACILITY

- (2) Goals:
- o Further research and education concerning tree and plant life
 - o Accomodate visitors in an efficient, attractive and informative manner
 - o Disseminate information and make the visitor feel both welcome and comfortable
 - o Provide for efficient and effective maintenance for operation and management
 - o Develop accurate maps of all utilities, gardens, collections and research plots

(3) Implementation Measures

a. General Site Improvements:

- o Establish a separate Public Affairs Office
- o Provide new visitor facilities
- o Establish new signs
- o Establish a staffed visitors kiosk at entrances
- o Provide alternative means of transportation for the visitor
- o Provide a food service

b. Education, Gardens, and Collections:

- o Refurbish and upgrade existing gardens and collections that are to be retained.
- o Relocate and redesign gardens that are not in good shape
- o Establish new gardens/collections
- o New tree collection
- o Latrobe Column Garden
- o Discovery Gardens
- o Festival Gardens
- o Establish plant outreach programs

c. Introduction, Exploration and Research:

- o Develop plans and grid system for plants at USNA, BARC and GPIS
- o Eliminate all non-essential plants from USNA and BARC to make room for new collections
- o All collected plant material should have a place to be set out upon its return and areas of collection carefully selected.

d. Repositories:

- o Create the most complete library, plant records and herbarium on woody ornamental plant material at the USNA that exists anywhere
- o Catalog and map all plant material associated with the USNA including those at Glenn Dale Plant Introduction Station (GPIS) and the Beltsville Agriculture Research Center (BARC)
- o Provide additional climatically controlled space to expand the capacity of the USNA herbarium

(4) Master Plan Development Concepts:

a. General Site:

- o Influence surrounding neighborhood by beginning its own beautification program
- o Develop a signage system to move visitors through grounds
- o Provide adequate restroom facilities, bike racks, and trash receptacles

b. Plant Life Center:

- o Provide all-weather experience for all visitors, including exhibition, meeting, reception, restrooms, restaurant, and picnic areas
- o Present a strong visual and physical connection to the parking areas and to the other parts of the USNA
- o Develop a secured area to allow night use without impacting the rest of the site

c. Administration and Service Area:

- o Develop additional space in the Administration Building, Greenhouses and Service Areas
- o Relocate service area to the northwest corner of the site to provide areas for shops, tram storage and repairs, plant recycling and storage. Area to be serviced by a new entrance at "T" Street.
- o Access Administration Building from "R" Street and should be restricted to employee and volunteer parking
- o Screen area to buffer activities of the research and education programs.

d. Gardens and Collections:

- o Upgrade, expand, develop, relocate and eliminate gardens/collections

Expansion:	<ul style="list-style-type: none"> o National Herb Garden o National Bonsai Collection o Asian Valley o Court of Honor
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Refurbish:	<ul style="list-style-type: none"> o Azalea hillside o Rhododendron and Azalea Valleys o Maple, Holly, Magnolia, Fern Valley, Cherry and Crabapple
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- Proposed:
- o Latrobe Column Garden
 - o North American Garden
 - o Discovery Gardens--
(Plant Achievements of the
U.S. Department of Agriculture)
 - o Festival Gardens--
Displays of plants in the
restored brick kilns
 - o Ferry to link USNA and the
Kenilworth Aquatic Gardens
- Special Areas:
- o Mt. Hamilton (second highest
point, 239 feet; vantage point
to Monumental Washington)
 - o Indian Ceremonial Grounds
(corner of Hickey Run and
Anacostia)
 - o Spring Houses (two circular
houses)

(5) Long-term Objectives:

- a. Transportation:
- o Public Transportation
 - o One-way System
 - o Signage
- b. Major Visitor Entrances:
- o New York Avenue
 - o M Street - Maryland Avenue

c. Parking Capacity:

<u>Location</u>	<u>Surface Parking Only</u>	<u>Surface Parking & Structure</u>
NY Avenue Entrance	375	1,200
M Street Entrance	500	500
R Street Entrance	143	143
TOTAL	1,118	1,943

- d. Tram System: Recommends a route with designated stops
be instituted.

VIII. Other Information:

1. Did the presence of any universities, research facilities or factories in the area surrounding your botanical garden have an influence on the establishment of your arboretum? If so, please indicate the name, type and scale of any such organizations.

Close proximity to the Nation's Capitol, the District of Columbia, was the first consideration. Location near universities or factories was secondary.

2. Does your arboretum include any leisure or sightseeing establishments? Does the surrounding area have such establishments? If so, please describe.

The Arboretum has thirty major gardens and collections, including Herb Garden, Japanese Garden and Bonsai Collection, Azalea gardens; Boxwood, peony, Day Lilly, and Iris garden, National Country Garden, Maple collection, Crabapples, Fern Valley Daffodils and Ivy, Dogwoods, Dawn Redwoods, and others.

3. Does your arboretum make or sell any special products or souvenirs? If so, please describe.

There is nothing for sale by Arboretum, although a small gift shop is run by the Federation of Garden Clubs of America.

4. Does your arboretum periodically issue any newsletters or public relations materials? If so, please name and describe the contents of such periodicals.

Arboretum events notices are sent 10 months of the year to a mailing list of about 4,500. Press releases are sent when appropriate. FONA (Friends of the National Arboretum) issues a regular monthly news-letter to its 2,000 members.

5. Does your arboretum sponsor any events of special interest? If so, please outline such events.

Various lectures, flower shows, classes, tours, and nature walks are offered by Arboretum staff, volunteers, and outside groups.

6. What is the capacity of the parking facilities at your arboretum?

There is parking for 200 cars, with overflow onto grass areas.

1985 Annual Research Progress Report

Accession 0018250
Mode Code: 1230-10-00

Project No: 1230-20030-001-00

Title: **Cytogenetics, Breeding, and Evaluation of Landscape Trees**

Developed in vitro culture systems for new selections of Birch (Betula), Elm (Ulmus), and Yucca. Such techniques will allow the rapid propagation of material for extensive evaluation trials and distribution to nurseries. Twenty new hybrid selections of Holly (Ilex) were propagated and distributed for evaluation. Preliminary assessment of resistance to Elm Leaf Beetle in more than 700 hybrid Elm progenies indicated that resistance could be transmitted from Ulmus wilsoniana. Published comprehensive cultivar checklists in Dogwood (Cornus), Linden (Tilia), and English Oak (Quercus robur) and maintained registration lists of cultivars in Holly (Ilex). Such genetic-taxonomic research establishes and stabilizes correct nomenclature of cultivars in the nursery trade and facilitates cultivar evaluation programs. Extended observations on wound compartmentalization in trees to include the effects of root severance. Trees that were strong compartmentalizers of trunk wounds were also less likely to suffer trunk decay when roots were injured. The possibility that successful grafts occur only between strong-compartmentalizing stocks and scions suggests that inadvertent positive selection has occurred. Made first interspecific hybrids in Goldenrain Tree (Koelreuteria) and verified one-year-old hybrids by means of peroxidase isozymes.

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2. Bentz, S.E., D.P. Stimart, and M.S. McIntosh. 1985.
Root and Shoot Growth Patterns of newly Rooted Woody Plants. Jour. Amer. Soc. Hort. Sci. 110:308-313.
3. Eisenbeiss, G.K. 1985.
"The Future of Holly." Jour. Holly Soc. Amer. 3(4):16.
4. Eisenbeiss, G.K. and T. R. Dudley. 1985.
"International Holly Registration." Jour. Holly Soc. Amer. 3(1):31-33.
5. Eisenbeiss, G.K. and T.R. Dudley. 1985.
"International Holly Checklist." Jour. Holly Soc. Amer. 3(1):33.

6. Eisenbeiss, G.K., and T.R. Dudley. 1985
"Arboretum Report". J. Holly Soc. Amer. 3(1):36.
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"Holly Registrations". J. Holly Soc. Amer. 3(3):17-19.
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"Development of a Tissue Culture System for the Hybrid Elm
Clone 'Pioneer'". Hortscience 20:593(Abst.).
10. Harvey, W.R., and A.M. Townsend. 1985.
Selection on a Combination of INdividual, Family, and
Stand Merit in Provenance Tests. Forest Sci. 31:813-821.
11. McArdle, A.J., and F.S. Santamour, Jr. 1985.
"Cultivar Checklist for English Oak (*Quercus robur*)".
12. Santamour, F.S., Jr. 1985.
"Cambial Electrical resistance: Variation with Season,
Stem Size, and Position in Tree". Northeastern Forest.
Tree Improve. Conf. Proc. 29:134-137(1984).
13. Santamour, f.S., Jr. 1985.
"Developing Improved Landscape Trees for the United
States: Progress since 1975:.. In. D.F. Karnosky and
S.L. Karnosky (Eds.) Improving the Quality of Urban Life
with Plants, N.Y. Bot. Gard. Ins. Urban Hort.
14. Santamour, F.S. Jr. 1985.
"Truck Wood Discoloration and Decay Following Root
Wounding. J. Arboric. 11:257-262.
15. Santamour, F.S., Jr. and A.J. McArdle. 1985.
"Cultivar Checklists of the Large-Bracted Dogwoods:
Cornus Florida, *C. Kousa*, and *C. Nuttallii*". J. Arboric.
11:29-36.
16. Santamour, F.S., Jr. and A.J. McArdle. 1985.
"Checklists of Cultivars of Linden (*Tilia*). Species",
J. Arboric. 11:157-164.
17. Santamour, F.S., Jr. and R.L. Pryor. 1985.
'Pryored' Azalea. The Azalean 7:32.

Annual Research Progress Report 1985

0018249

1230-20030-006

Title: Germplasm Evaluation and Genetics of Shrubs

Triploid Hibiscus syriacus that produce few seeds, continuously initiate flower buds, and flower from early summer to autumn have been propagated, with 1,118 plants distributed for stock increase of two selections to be designated cultivars.

Mildew resistant Lagerstromia indica x L. fauriei have been selected with an array of flower colors; spectacular trunk bark; and dwarf, intermediate and tree growth habits. From advanced hybrid populations 36,142 plants of 45 selections were distributed to evaluation and stock increase, 8,985 cuttings were propagated of 209 selections for evaluation, and descriptions and releases prepared for cultivar introduction of 14 selections.

Malus selections with resistance to the four major diseases have been isolated from hybrid populations that combine flower, fruit, foliage and growth habit landscape characteristics. During the year 4,343 plants of 9 selections were distributed for evaluation and stock increase, 1,044 disease resistant seedling selections were field planter for evaluation, 3,689 advanced generation seedlings produced, 1,832 cuttings propagated of 20 selections for potential cooperator distribution, and descriptions and releases prepared for 2 selections to be designated cultivars

Scab and fireblight resistant Pyracantha hybrid progeny have been recovered with abundant flower and fruit, semi-to evergreen foliage, and dense branching characteristics. 1,100 plants of 2 selections have been distributed to cooperators for stock increase, 1,355 advanced generation seedling selections field planted for evaluation, 418 compact to dwarf seedlings container grown, and cultivar descriptions and releases prepared for 2 selections.

Interspecific hybridization of S. oblata dilatata and S. vulgaris cultivars to create mildew and heat tolerant S. x hyacinthiflora progeny has yielded 4,579 seedlings.

Four interspecific hybrid Viburnums with low growth habit, dense branching profuse flower and fruit, and heavily textured foliage with autumn colorations have been prepared for introduction and 2,527 plants distributed to cooperators for stock increase.

1985 ANNUAL RESEARCH PROGRESS REPORT

Accession 0018251
Mode Code: 1230-15-00

Project No: 1230-20160-001-00

Title: Nomenclature and Taxonomy of Cultivated Plants

Completed a 1200 page manuscript on 16th Century herbal of Leonhart Fuchs and a monograph on carbonized remains of 26 food plants at Pompeii and other Vesuvian sites. Published correct nomenclature on the red water-lilly, Nelumbo nucifera var. caspicum. Registered over 700 woody landscape plant cultivars with international registrar of nomenclaturally cultivated plants. Published 3 species of Alyssum as new to science; described 2 new subspecies of Viburnum. Published 7 new cultivars of Ilex. Participated in plant exploration in Korea for germplasm of woody landscape plants; made 350 living accessions and in excess of 900 herbarium specimen vouchers; prepared a preliminary research report, emphasizing Ilex of Korea; discovered Viburnum Boninsimense as a new record for Korea on Schuksan Island. Participated as team member as scientific liaison on trip to the People's Republic of China. Prepared in-depth study of cultivated species and cultivars of Tilia, including a critical evaluation of T. Dasystyla and T. Euchlora. Identified CA. 200 new collections of cultivated trees, shrubs, woody vine, and ground covers in Delaware, Maryland, DC, South Carolina, Georgia, and Alabama for south-eastern US woody landscape plants project. Added CA. 9500 research specimens to the permanent herbarium collection.

PUBLICATIONS:

1. Defeo, R. and T.R. Dudley. 1985. The Caspicum Lotus (Nelumbo Nucifera var. Caspicum). The Water Lilly Jour. 1(3):17.
2. Dudley, T.R. 1985. International Registrations of Cultivar Names for Unassigned Woody Genera 1981-1984. Bull. Amer. Assoc. Bot. Gd. and Arb. 18(4):97-129 [dated October 1984].
3. Dudley, T.R. 1985. Casseena: Black Drink. Jour. Holly Soc. Amer. 3(2):1-2.
4. Dudley, T.R. 1985. Prognostications: The Future of Holly. Jour. Holly Soc. Amer. 3(4):5.
5. Dudley, T.R. 1985. Institutions to Receive Free HSA Bulletins. Jour. Holly Soc. Amer. 3(1):8.

6. Dudley, T.R. 1985. [4-20 May] Fona Delegation to the People's Republic of China - Scientific Observations [dated 23 July 1985; unpublished].
7. Dudley, T.R. 1986. International Registrations of Cultivar Names for Unassigned Woody Genera. Bull. Amer. Assoc. Bot. Gd. & Arb. 19(3):86-96 [dated Oct. 1985].
8. Dudley, T.R. 1986. International Registrations of Cultivar Names for Unassigned Woody Genera 1984 (continued). Bull. Amer. Assoc. Bot. Gd. & Arb. 19(4):129-131 [dated Dec. 1985].
9. Dudley, T.R. 1986. Viburnum Cotinifolium D. Don and Two New Intraspecific Taxa. Feddes Repert. 97(3-4):129-133.
10. Dudley, T.R. 1986. A New Nickelophilous Species of Alyssum (Cruciferae) from Portugal: Alyssum Pintodastivae T.R. Dudley Sp. Nov. Feddes Repert 97(3-4):135-138.
11. Dudley, T.R. 1986. A Nickel Hyperaccumulating Species of Alyssum (Cruciferae) from Spain: Alyssum Malacitanum (Rivas Godoy) T.R. Dudley, Comb. & Stat. Nov. Feddes Report. 97(3-4):139-142.
12. Dudley, T.R. 1986. New Taxa of Ilex from Guangxi and Yunnan Provinces, People's Republic of China. Jour. Holly Soc. Amer. 4:Accepted for Publ.
13. Dudley, T.R. 1986. The 1985 National Arboretum Plant Exploration in the Republic of Korea - Preliminary Report. Jour. Holly Soc. Amer. 4:In Press.
14. Dudley, T.R. and D. Christodoulakis. 1986. A New Endemic from Samos: Alyssum Samium T.R. Dudley & D. Christodoulakis, Sp. Nov. Willdenowia Accepted for Publ.
15. Eisenbeiss, G.K. and T.R. Dudley. 1985. International Holly Registrations. Jour. Holly Soc. Amer. 3(2):10.
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17. Eisenbeiss, G.K. and T.R. Dudley. 1985. The C.R. Wolf Award. Jour. Holly Soc. Amer. 3(1):10.
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24. Mazzeo, P.M. 1985. The Cultivated Lindens (Tilia) in Virginia (Abstract). Va. Jour. Sci. 36(2):122. 1985.
25. Meyer, F.G. Food Plants Identified from Carbonized Remains at Pompei and Other Vesuvian Sites. In Studia Pompeiana Et Classica in Honor of Dr. Wilhelmina F. Jashemski (Festschrift). Accept. for Publ. 23 Aug. 1985. Chapt. in press.

EDUCATION/INFORMATION UNIT 1985 ANNUAL REPORT

The Education/Information Unit continues to provide service and interaction with the general public, nurserymen, horticulturists, botanists, teachers, students, garden clubs, growers, landscape architects, naturalists, governmental and planning officials, and visitors of all kinds, both foreign and domestic with respect to plants and their diversified uses through the medium of demonstrations, exhibits, conducted tours, classes and workshops, conferences and symposiums, public lectures, film showings, publications, program aids, press releases and press interviews, radio and television.

The Education/Information Unit continues to disseminate the findings of research conducted at the Arboretum to the general public and the scientific community both in this country and abroad and provides an outreach to the millions of people who live in, or visit our Nation's Capital.

Demands on the Education/Information Unit continue to increase dramatically with the rapid escalation of visitors and number of public inquiries. Guided tours now number over 300 annually necessitating a greater effort at recruitment of volunteer guides and increased emphasis on training. Additional volunteers have been recruited for the Arboretum library, collections, and greenhouse, and an effort is now underway to obtain volunteer assistance for the herbarium. Much of the success in obtaining volunteers has been through the inclusion of requests in our monthly events flyer.

Publications

Neumann, E.A. 1985. Arbor Day. The Reporter. February 27, 1985

Neumann, E.A. 1985. The Story of the Glenn Dale Azaleas and the National Arboretum. The Azalean. Volume 7, Number 1. March 1985.

Neumann, E.A. 1985. America's Showplace—The United States National Arboretum. The Aegis and the Times Home and Garden '85. April 4, 1985.

Neumann, E.A. 1985. Washington's Living Museum. News and Views, Safeway, Washington, D.C. Division. March/April 1985.

Annual Research Progress Report 1985

0045760

1230-20030-004-00

Plant exploration to SW coast and off-shore islands Republic of Korea added 326 germplasm accessions for Arboretum plant collections and breeding programs. Plant collecting trip to nurseries, arboreta and private collections in Japan added 282 germplasm accessions. Coordinated production of U.S. National Arboretum garden for the 1985 Washington, DC Flower Show: 65,000 visitors. Renovation of Gotelli Conifer Collection continued, 50 new accessions added. New irrigation system installed. Extensive planting of herbaceous perennials in Asian Valley from 1984 Korean explorations. Renovation of Camellia Collection area and replanting with a variety of Japanese woody plants from earlier explorations. Continued renovation of Fern Valley/ivy-daffodil plantings, adding 3,000 plants. Revitalized volunteer programs for Fern Valley with NCA Federation of Garden Clubs and Washington Daffodil Society. Continued renovation of Azalea and Rhododendron Collection Area. Major focus on Lee Garden with correction of drainage problems, installation of stone and post edging, and planting of 103 satsuki azalea cultivars. In National Herb Garden increased plantings of herbal perennials or rose and specialty gardens with emphasis on aesthetic combinations. Finalized working drawings for American Wing, National Bonsai Complex in association with National Bonsai Foundation.

Chiplis, D.C. 1985. The Curator's Prospective, Interview with Robert Drechsler. The Journal of the American Bonsai Society, Vol. 18, no. 4, Winter 1984.

Chiplis, D.C. 1985. Chronology of Container Tree Development. Potomac Bonsai Association, Vol. 10, no. 11, December 1985.

Martin, S.F. 1985. *Cedrus atlantica*. American Nurseryman, June 15, 1985.

Martin, S.F. 1985. Cover. American Conifer Society Bulletin, Vol. 2, no. 3, Winter 1985.

Shimizu, H.H. 1985. Old Roses. Herb Society of America News. Spring 1985.

Shimizu, H.H. 1985. Herbs. Gardens for All. August 1985.

Shimizu, H.H. 1985. A Herb Workshop for Children. Plants and Gardens, Vol. 40, no. 3, 1985.

Shimizu, H.H. 1985. Herb Garden Design-Book Review. Garden, Jan./Feb. 1985.

Shimizu, H.H. 1985. Sweeter Than Sugar. Potomac Potpourri, Dec. 1985.

Shimizu, H.H. 1985. Summer Survival. Potomac Potpourri, Sept. 1985.

- Shimizu, H.H. 1985. Herbal Trees. Potomac Potpourri, August 1985.
- Shimizu, H.H. 1985. Pesticides on Herbs. Potomac Potpourri, March 1985.
- Shimizu, H.H. 1985. An Herb Garden Companion. Potomac Potpourri, Jan. 1985.
- Yinger, B.R. 1985. Cultivars of Japanese Plants at Brookside Gardens,
Part II. (With Carl R. Hahn). Arnoldia, Vol. 45, no. 2, Spring 1985.

Members of the Library Committee for 1985 were Chairman Erik A. Neumann, Rene Eisenbeiss, Elizabeth Ley, Sylvester March, Frederick G. Meyer, Holly Shimizu, Barry Yinger and ex-officio Henry M. Cathey. Delegates from the National Agricultural Library (NAL) were Elizabeth Goldberg, Head, Farming Forestry Reference Branch, Jayne MacLean, Reference Librarian and Susan Whitmore, Arboretum Branch Librarian and Reference Librarian, NAL.

Book Purchases: The purchasing of books and the renewal of serial subscriptions for the library is handled by the Acquisitions Branch of NAL. Selections are made by the Library Committee and are forwarded to NAL by the branch librarian. Funds for book purchases are provided by NAL and funds for serial purchases are transferred to NAL from the Arboretum budget. As in the past, NAL has continued to catalog books for the library. Approximately 118 monographs were added to the Library's collection in 1985 and 170 serial titles were received. Notable additions to the collection include the Herbaria on Microfiche and Seed Lists on microfiche consisting of over 13,000 microfiche containing photos of herbarium specimens from 26 worldwide herbaria and photos of seed lists from Europe from 1818 to 1900.

Gifts: The library's collection has continued to grow, in part, due to the generosity of many who have contributed their books and money for books over the year. Funds designated for the Library by Friends of the National Arboretum (FONA) were used to have archival boxes made for issues of The Gardeners' Chronicle, Garden and Forest, and The Garden from the late 1800's.

Publications: Library publications for the year include a Serials List, listing all the serial publications contained in the library; Current Serials List, listing serial publication to which the library currently subscribes; and 1985 Accessions List, listing all new publications acquired by the library last year.

Staff and Volunteers: The NAL has loaned several staff members to the library to complete the following special projects: shelving of periodicals, labelling files, shelf reading, pulling serials for binding, and shifting books in the stacks. FONA has also helped the Library in advertising in its newsletter for Library volunteers and FONA member Beverly New began in December to help in the library one day a week.

Submitted by,



Susan C. Whitmore
Librarian
July 31, 1986

U.S. NATIONAL ARBORETUM WEATHER DATA
1985

<u>MONTH</u>	<u>MAX. °F</u>		<u>MIN. °F</u>		<u>PRECIPITATION</u>	
		<u>Norm.^a</u>		<u>Norm.^a</u>	<u>inches</u>	<u>Norm.^a</u>
January	65	80	-6	0	3.02	2.92
February	80	82	13	-1	3.02	2.76
March	83	91	20	9	1.85	2.48
April	91	94	26	22	.05	3.21
May	88	96	36	25	5.42	3.85
June	92	100	49	44	3.01	3.92
July	95	104	53	50	2.95	4.05
August	99	102	53	46	3.45	5.30
September	97	102	40	33	5.56	3.42
October	82	94	33	20	3.48	2.75
November	76	87	30	15	5.43	3.14
December	61	74	8	5	1.55	3.20
12 months	99	104	-6	0	38.79	41.00

^a Means for 1946-1970

PLANT DISTRIBUTION PROGRAMS

The National Arboretum presently exchanges plant materials with over 700 botanic gardens, arboreta, universities, nurseries, and other institutions conducting educational or research programs with woody plants.

The following plant distributions were completed:

1) 1985 Seed List

168 accessions, 127 foreign institutions responded, 2,166 packets of seed sent.

2) 1985 General Plant Distribution

74 accessions, 83 domestic institutions and 12 foreign institutions responded, 4,922 plants sent.

3) 1985 Special Distribution of the following five United States National Arboretum Introductions:

NA 36544	<u>Azalea</u> x 'Pryored'
NA 28352-1	<u>Magnolia</u> x 'Spectrum'
NA 36539	<u>Platanus</u> x 'Colombia'
NA 36537	<u>Platanus</u> x 'Liberty'
NA 36533	<u>Ulmus paviiflora</u> 'Dynasty'

77 domestic institutions responded, 777 plants sent.

4) 1985 General Requests

170 requests honored.

1,172 plants sent
 4,224 cuttings sent
 635 scions sent
 52 packets of seed sent.

1985 National Arboretum Plant Exploration
in The Republic of Korea
Stage II: Southwest Coast and Off-shore Islands

T.R. Dudley

The second year of the 5-year research program of plant exploration in The Republic of Korea commenced in August 1985 under the auspices of the Friends of the National Arboretum, Inc. (FONA). This year's trip was funded most generously by Research Grants from the Tom Dodd Nurseries (Semmes, Alabama), Holly Society of America, Inc., North Carolina State University (Raleigh, North Carolina), R. J. Reynolds Industries, Inc. (Winston-Salem, North Carolina), and the University of British Columbia Botanical Garden (Vancouver, B.C.). Several private individuals, namely, Mr. Cornelius Bond, Mrs. E. Linforth, Mrs. J. P. Reath, Mrs. W. C. Seipp, and Mr. P. M. Sprey, also contributed generously to the success of the 1985 Korean Expedition. The expedition participants are deeply indebted to the above organizations, institutions and private individuals for their gracious support and dedication to the plant exploration programs of the U.S. National Arboretum. We are also most appreciative to Mr. Kim Un-Cho (Seoul) for his ever friendly assistance, hospitality, and permitting us to use his facilities as a base of operations. We are also grateful to Mr. C. Ferris Miller (Min Pyong-gal) of Seoul and the Chollipo Arboretum Foundation for his usual superlative hospitality, sharing of information, and plant materials. The U.S. Agricultural Counselor, Mr. Daniel Conable and his staff, especially Mr. Ahn Kyoung-ho, at the U.S. Embassy in Seoul were always extremely friendly and very helpful.

The principal participants on Korea 1985 were Dr. T.R. Dudley (NA), Dr. J.C. Raulston (Dept. of Horticultural Science, NCSU), Mr. P. Wharton (UBC Botanical Garden) and Mr. Barry Yinger (NA). We were assisted extremely competently by Chang Young-June and his brother Chang Young-Hun. For several weeks at a time the team also had excellent assistance from Kim Kun-so and Song Ki-hun.

As with the 1984 (Stage I) Korean Expedition, Mr. Yinger planned and organized the itinerary, logistics, work assignments and capably represented the team. His knowledge of Korea and its vegetation was clearly demonstrated by the absence of functional problems, and by the qualitative and quantitative excellence of the expedition's germplasm and herbarium specimen vouchers.

It may be advantageous for future explorations to expand communication, consultation, discussion and planning between American team members to build stronger rapport. These elements will have desirable impact on day-to-day operations, reduce potential misunderstandings and insure that varied talents and expertise of all participants be utilized most efficiently. The crucial balance of botanical and horticultural participant interests was very efficient and is an organizational attribute to be incorporated in planning and executing all future National Arboretum and/or FONA administered plant explorations.

The 320 germplasm collections of Korea 1985 have been divided among the six intended recipients; namely, the three participating institutions and Tom Dodd Nurseries, Holly Society of America (HSA) and R. J. Reynolds Industries. The research grant from HSA specified interest only in Ilex. Accordingly, a large amount of seeds of 35 Ilex collection numbers were sent to Dr. W. T. Witte (University of Tennessee), the HSA designee, for propagation, evaluation and distribution. The nearly 900 herbarium specimen collection numbers (c. 2,000 actual specimens) are awaiting labelling and distribution to the herbaria of the the three participating institutions and

that of Seoul National University. A Preliminary Report of the 1985 NA/FONA plant exploration in the Republic of Korea, emphasizing Ilex, has been published in the Winter 1986 Journal of the Holly Society, 4 (1):19-25.

My participation on the 3-month expedition unfortunately was cut short because after 2 months of rather exhausting climbing a back condition intensified. Rather than jeopardize the continuing successes of the expedition, I returned to the National Arboretum the first week of October, carrying the large quantities of seed, cuttings and plants amassed to that point. I left Korea secure on the knowledge that Mr. Yinger and the Korean assistants, in the remaining month, would successfully complete collecting, documentation and introduction of unique germplasm. My expectations were fulfilled and justified.

The vegetation of Korea, because of war destruction, continuing deforestation, foraging animals and intensive agriculture, could be described as poor overall (like many Asian countries). Yet, the flora composition is rather rich. The mosaicked panorama of unglaciated topography and microhabitats on the southwest coast and off-shore islands, which have allowed a unique and rich flora to develop, have never before been adequately explored nor sampled. Throughout the 19th and 20th centuries Korea has largely been ignored by western plant explorers and introduction of documented wild-origin germplasm has been nominal. Wild-origin and provenance representation of many taxa, especially target species, were collected throughout their entire distributional range. Accordingly, vouchers and germplasm of species such as Daphniphyllum spp., Euscaphis japonica, Machilus thunbergii, Rhamnella franguloides, Styrax japonica and the several species and hybrids of Ilex, etc. were collected whenever encountered. Although some species superficially appear to be well-known in cultivation from other countries, wild-origin Korean material is practically unknown, at least in the U.S. Collecting emphases were oriented primarily toward woody target taxa; however, choice perennial herbaceous genera such as Hemerocallis, Hosta, Asarum, Arisaema, etc. were not ignored. A number of Soybean (Glycine max) collections were made and distributed to interested parties in USDA.

ITINERARY

1. PYONSAN PENINSULA and vicinity. August 6-8 and October 3-9. Many target taxa were found here; especially significant are collections from northernmost Korean stations.

SELECTED COLLECTIONS

Acer ginnala
Campsis grandiflora - a very important highly decorative high climbing woody vine with immense orange-pinkish flowers; known only cultivated on the Korean west coast, but presumably originally dug from the wild where it is now apparently annihilated.
Carpinus tschonoskii
Celastrus flagellaris
Cornus kousa and C. walteri
Eurya japonica
Euscaphis japonica
Fraxinus sieboldiana

Gleditsia japonica var. koraiensis
Ilex cornuta - northernmost wild population in Korea and a National Monument; two expressions - the nearly spineless var. fortunei and the typical spinose var. cornuta; unfortunately no fruit available in the wild, but seed and vouchers from cultivated plants verified as having been dug locally in the wild.
Ilex crenata - northernmost wild population in Korea and a

National Monument; vegetative material of evergreen Korean *Ilicies* not permissible for introduction due to heavy scale infections.

I. macropoda - A deciduous species virtually unknown in the west.

Juniperus rigida

Lindera glauca and

L. obtusiloba

Machilus thunbergii - northernmost fertile population still extant in the wild and a National monument; population on an exposed cliff-embankment virtually at water's edge.

Mallotus japonica

Malus baccata and M. sieboldii

Pyrus calleryana var. faureri

Quercus serrata

Rhamnella franguloides

Rhamnus koraiensis - genus as a whole underutilized in the landscape.

Sapium japonicum

Sorbus alnifolia - choice specimen and landscape tree.

Styrax japonica

Vaccinium oldhamii

Viburnum dilatatum, V. erosum

and V. sargentii

Zanthoxylum piperitum and

Z. schinifolium - genus underutilized as a landscape plant.

Zelkova serrata

2. MOKPO, YUDAL SAN and vicinity. August 9-11 and September 26. Mokpo is an attractive, bustling and very noisy port city - the gateway to the 1,000+ offshore islands in the Yellow Sea. Yudal San is a sacred mountain rising in the middle of the city to 200 meters.

SELECTED COLLECTIONS

Albizia coreana - exceptionally rare Korean endemic tree known to occur naturally only on Yudal San. Because of the abundance of A. julibrissin and intermediate hybrids also there it's very doubtful if the integrity of "pure" A. coreana will be maintained, except by propagation of plants dug there and cultivated elsewhere, such as at the Chollipo Arboretum.

3. SOHUKSAN ISLAND in the off-shore Huksan group. August 14-16 and September 17-20. Lying in the Yellow Sea, Sohuksan Island is the remotest of all the S.W. Korean Islands, taking nearly 2 uncomfortable days by ferry from Mokpo with an overnight stop at Taehuksan Island, also very interesting botanically. Sohuksan without question was the botanical diamond and one of the most important locales in the 1985 Korean trip, possessing the highest mountain, up to nearly 800 meters, of the S.W. coast and the largest expanse along an altitudinal gradient of relatively undisturbed vegetation to be encountered. Unfortunately, with three growing villages, deforestation is occurring at such a rapid rate that in 3-5 year's time there will be little of interest left, except possibly at the very highest elevations. The experiences on Sohuksan, particularly as expressed by the local population, who cannot fathom any problems forthcoming from deforestation, pointedly demonstrate the urgency for plant exploration "rescue" before plants in the wild are totally annihilated. Sohuksan had never before been visited by western botanist, Japanese or Korean. The first trip to Sohuksan was slower than anticipated because of a typhoon. Arriving in very bad seas, landing at Sohuksan was exceptionally difficult and I injured my leg in the process. The resulting stubborn infection plagued me throughout the trip. Because of typhoon weather most of the collecting was in heavy rain. We did not have sufficient time to conduct a thorough botanical survey nor adequately sample the vegetation of the entire island. The very wet 1985 Autumn on Sohuksan (and for all the southwest coast) considerably delayed fruit ripening.

Giant trees of Ilex, Castanopsis, Quercus, Prunus, Styrax, Camellia, Dendropanax, Cornus controversa, Neolitsea sericea, Daphniphyllum, etc., and the indigenous population of Machilus thunbergii are rapidly being exterminated. It is crucial that Sohuksan be revisited in the near future throughout all seasons, especially late Autumn (October–November) to document with germplasm and herbarium vouchers the unique flora destined for irrevocable destruction. Despite injury, foul weather, poisonous snakes and land leeches I would gladly return to Sohuksan. We are indebted to Kim Jae-ho, former head-man, and his family for turning over practically their entire home and buildings to us. My observations about Sohuksan, particularly about Ilex integra (some at least 500 years old) but applicable to other species, are presented in a recently published report:

From Taehuksan Island we journeyed by ferry for nearly another whole day, at the beginning of another typhoon, to Sohuksan (34° 05' N, 125° 10' E), the outermost Korean island in the Yellow Sea. Sohuksan is a botanical diamond and has the richest and most intact flora of any area visited. It is a spectacular island whose cliffs and escarpments rise sheer from the sea. The Sohuksan mountain at 620 meters elevation is the highest peak of the southwest coast and offshore islands. Sohuksan had never before been explored by western botanists, and to our present knowledge has not been visited by any Korean (there are very few) or Japanese botanists. Approximately one half of Sohuksan fortunately is still relatively undisturbed. On the very steep and hazardous terrain there are many large and mature populations of rare, threatened and endangered woody plants. A large number of "giant" or record trees of many genera and species were discovered, and *I. integra* was no exception.

The remaining mature vegetation of Sohuksan is, however, in great danger because the decline of fishing has forced the local people to press up the mountain slopes to clear-cut the forest and harvest the medicinal bark of *Machilus thunbergii* Siebold & Zuccarini (such harvesting, of course, kills the trees). The villagers naively hope that when the forests are clear-cut and disturbed, the *Machilus* will regenerate. These people do not understand that clear-cutting the ancient forests at the mid and upper elevations will absolutely destroy the natural habitat of the indigenous wood dove which is the sole vector for distributing the seed of *Machilus*.

The majestic trees of *I. integra* on Sohuksan were truly amazing: 10–25 meters in height with trunks 0.7 to 2 meters in diameter! This species was evident locally at several sites on the island from 50 to 200 meters elevation — this zone also supported disgusting terrestrial leeches. Our host and previous chief of the village we stayed in told us that they used *I. integra* to make birdlime to snare birds and rodents. A number of large trees of *I. integra* were cropped with stumped branches and crowns; these trees were sprouting back very well and were fruiting. This practice was obviously in equilibrium with nature. However, we quickly discovered that the villagers were doing a terrible thing. Many of the largest *I. integra* were being killed outright by the locals who were totally girdling the trees at their bases. For example on our second trip back to Sohuksan in September we spotted in the dense forest a mammoth and very heavily fruited *I. integra*. Upon arriving at its base we were stunned to find that it had been freshly girdled, perhaps the day before we returned. Unfortunately, the trunk was unclimbable and the lowest branches were 5 meters above the ground, and we could not collect herbarium specimens or seed. Invariably, the ancient trees, 250–350 or more years old, of *I. integra* that had been girdled were females in fruit. The villager's logic is impeccable: the female trees are the first to go because they produce the seed which gives rise to new plants. Never before have I seen such a dramatic, systematic and all-out campaign to destroy totally a single species. There is no question in my mind that the mature *I. integra* on Sohuksan represent the largest and oldest *Ilex* in Korea, if not in all of Asia.

Obviously, the *I. integra* population on Sohuksan should be designated a National Monument, as are *I. crenata* and *I. cornuta* on the Pyonsan Peninsula. The villagers, however, are adamant in their simplistic view that even though they are destroying the forest, the forest will always be there. And who is to know? Sohuksan is very remote and no Korean botanist has ever been there.

A large quantity of seed of *I. integra* from several trees, including a "megaf fruited" one, was collected during our August and September visits. Unfortunately, even in September the growth was too soft to take cuttings.

SELECTED COLLECTIONS

Actinodaphne lancifolia
Boehmeria nivea
Buxus microphylla var. koreana
Camellia japonica
Castanopsis cuspidata var. sieboldii - potentially excellent landscape tree with leaves metallic - coppery on lower surfaces, some difficulty in preventing locals from eating our seed collections as nuts are edible.
Cornus controversa - very fine for landscape use.
C. kousa - The Sohuksan population appeared morphologically distinct with thickened leaves having crenulate - undulated - mucronulate margins; demonstrated stress - tolerance.
Daphniphyllum teijsamannii
Eurya emarginata - quite rare, seen most often in inaccessible sites; extremely attractive with glossy dark-green convex leaves.
E. japonica
Ficus erecta and F. sp. - possibly a new taxon.
Ilex integra - mammoth trees with basal trunk diam. up to 6 feet!
Kadsura japonica - attractive evergreen vine with clusters of pendulous red-orange fruit.
Litsea japonica
Neolitsea sericea - a potentially important

landscape tree with silvery -glaucous or copper-colored leaf undersurfaces.
Mallotus japonicus
Quercus acuta
Rhododendron dahuricum - only population encountered in 1985 on summit ridges.
Stauntonia hexaphylla - very attractive, robust, high climbing evergreen liana.
Styrax japonica - abundant seed and vegetative propagation material collected from selected individuals and populations; on this island showing some unusual morphological variation and considerable stress - tolerance.
Trachelospermum asiaticum
Viburnum boninsimense - a very exciting discovery never before reported in Korea, previously known only from the Japanese Bonin Islands; limited to a narrow mid-altitude zone; allied to but distinct from V. japonicum.
V. dilatatum
Zanthoxylum ailanthoides
The herbaceous genera Asarum and Arisaema were particularly noteworthy here; an Asarum possibly representing a new taxon. The rare and attractive Chrysanthemum zawadskii var. alpina was collected in the alpine zone of Mt. Tokshil.

4. TAEHUKSAN ISLAND; The largest off-shore island of the Huksan group. August 18-19 and September 20-23. Floristically an important area that needs to be revisited throughout the seasons. Although considerably more disturbed and with a far larger population density than Sohuksan, Taehuksan, the largest commercial port in the Huksan group, yielded excellent plant materials. The Hosta populations were impressive and the montane fern, Gleichenia japonica with spectacular silvery leaf undersurfaces would make a superior groundcover. Ilex x wandoensis, a naturally occurring hybrid first collected on Wando Island on the extreme south of Korea, was first encountered as a Bonsai subject in a Taehuksan restaurant. The locals maintained the plant was native to Taehuksan, but no trace could be found. However, one of the parents - I. integra - was indigenous and there is every reason to believe that the other parent - I. cornuta - had also been present, which through millenia of populations it has been exterminated. Accordingly, I. x wandoensis indeed could have been present as a native plant on Taehuksan.

SELECTED COLLECTIONS

Carpinus coreana
Caryopteris incana - summit
ridges.
Castanopsis cuspidata var.
sieboldii
Celtis edulis
Elaeagnus glabra
Eurya emarginata & E. japonica
Euscaphis japonica
Juniperus chinensis var.
procumbens & J. rigida
Ligustrum sp.
Lindera obtusiloba
Litsea japonica
Machilus thunbergii
Michelia impressa - a solitary
300+ year old, stately tree;
the only plant in Korea &
possibly introduced.
Quercus acuta, Q. aliena,
Q. salicina, Q. serrata and

Q. variabilis
Rhaphiolepis umbellata -
growing on very exposed sites
near the ocean and possibly
with residual genetic
hardiness necessary to broaden
cultivation range.
Rhamnus crenatus
Rhododendron mucronulatum var.
maritimum - very resistant to
salt and wind stresses.
Sorbus alnifolia - variable
and underutilized for
landscape purposes.
Styrax japonica - growing in
very exposed sites and
exceptionally salt-tolerant.
Vaccinium bracteatum
Viburnum carlesii & V. erosum
Zanthoxylum piperitum and
Z. planispinum

5. NAEJANG MOUNTAIN and vicinity. August 28-30 and October 11-13. This area is a large complex of spectacular peaks and ridges, steep escarpments, ravines and deep valleys. This is protected as a National Park and has a large array of lush vegetation - particularly at higher elevations away from tourist trails - and woody species useful in the landscape. A total of 6 days were spent here; however, more time would yield benefits.

SELECTED COLLECTIONS

Acer buergerianum -
cultivated; a particularly
fine specimen among many
planted along main road into
Naejang San.
Actinidia polygama
Alangium platanifolium var.
macrophyllum - a rare genus in
cultivation that will grow in
deep shade.
Boehmeria platanifolia
Carpinus laxiflora
Castanea bungeana
Cornus kousa, C. walterii & C.
controversa - the last
especially demonstrating great
vigour.
Corylus sieboldiana
Daphniphyllum macropodum -
growing in thickets
along trail at upper
elevations.
Idesia polycarpa
Ilex macropoda - immense vase-

shaped, multitrunked, tall
shrubs up to 25 or more feet
tall with equal crown
diameters; one of the largest
deciduous hollies; practically
unknown in cultivation; it now
seems evident that forma
pseudomacropoda has no
taxonomic integrity since
f. macropoda and
f. pseudomacropoda (they are
said to vary only in 1 minor
leaf indumentum character)
occur side by side in the same
population.
Lespedeza thunbergii var.
intermedia
Lindera erythrocarpa,
L. glauca, L. sericea,
L. obtusiloba & var. velutina
Meliosma myriantha &
M. oldhamii
Orixa japonica - rare genus of
Rutaceae seldom seen in the

west

Quercus variabilis

Rhamnella franguloides

Rhododendron schlippenbachii

Rhus fasciculatum var.

chinensis

Sapium japonicum

Staphylea bumalda

Torreya nucifera - Truly

awesome remnant forest,

designated a National

Monument, of this uncommon

gymnosperm, some individuals
said to be 750 years old.

Viburnum dilatatum, V. erosum
& putative hybrids.

Zanthoxylum schinifolium var.

inermis

There were many fine

perennials at this location,

especially Tricyrtis & Lycoris

- white & orange flowered

species.

6. WANDO ISLAND AND VICINITY. September 1-3 and October 18-23. This island at the southern tip of Korea was a focal point in 1985 because of its remoteness and having rarely been visited by botanists. About 10 years ago C. Ferris Miller, a NA cooperator, discovered on Wando a naturally-occurring hybrid between Ilex integra and I. cornuta. This new hybrid is to be named I. x wandoensis pending evaluation of the habitat and confirmation of the presence of the two parental species. This and a great deal more was accomplished on Wando in 1985. To our dismay, however, the hillsides that were once covered with these plants are now highly disturbed and for the most part the natural habitats have been destroyed due to the Koreans' proclivity to dig up plants in the wild and bring them into cultivation as garden or Bonsai specimens - in the case of the latter with little chance for long-term survival. Ilex x wandoensis and the parents are practically extinct in the wild and are best represented in gardens and verifiable as having been dug from the wild. In addition to the Ilex, Wando Island yielded numerous other exciting research and introduction materials.

SELECTED COLLECTIONS

Actinodaphne lancifolia

Carpinus coreana - rare tree
in cultivation; wild-occurring
in fully exposed site near
water.

C. laxiflora

Caryopteris incana - on
exposed S. facing bluffs near
ocean; previously collected on
high, dry mountain ridges.

Cephalotaxus coreana - a
poorly known target species
and rarely collected or
cultivated conifer growing in
thickets along seaside and
demonstrating stress-tolerance

Celtis biondii var.

heterophylla

Cinnamomum japonicum

Cornus kousa - small-fruited
expression with exceptionally
long peduncles.

C. walteri

Cudrania tricuspidata

Daphniphyllum teijsmannii-

beautiful small evergreen

tree, along with

D. macropodum, are

worthy of considerable

landscape attention.

Dendropanox trifidus

Elaeagnus macrophyllus

Euonymus japonicus var.

macrophyllus

Euscaphis japonica - a most

attractive, small dense, tree

with pink, rosy pink or bright

red infructescences and

capsules containing

glistening, jet-black seeds.

Ficus erecta and F. nipponica

Fraxinus sieboldiana

Gardneria insularis - very

rare Korean endemic evergreen

vine, probably not before

introduced.

Grewia biloba var. parviflora

Ilex macropoda - southern

station of this fine

ornamental.

Ilex cornuta, I. integra & the naturally occurring hybrid.

I. x wandoensis, - the last is polymorphic due to the genetic plasticity of parents. There are many phenotypic expressions; most exciting was a small cultivated tree verified as having been dug from the wild, with small, nearly spineless leaves, dense compact habit with abundantly displayed very early ripening fruit.

Kadsura japonica - attractive evergreen vine for dense shade.

Koelreuteria paniculata - first record of this taxon from this part of Korea; known to occur only two other stations considerably further north on the Western Coast.

Ligustrum quihoui var.

latifolium and

L. obtusifolium.

Lindera obtusiloba

Machilus thunbergii - southern representation of a target species.

Melasma myriantha &

M. oldhamii

Neolitsea sericea - most attractive and functional tree meriting landscape utility in U.S.

Photinia villosa var. longipes

Pittosporum tobira - possibly with residual genetic hardiness necessary to extend range of cultivation.

Poncirus trifoliata

Quercus acuta and Q. serrata - evergreen and deciduous oaks, respectively, and rare in cultivation.

Rhamnella franguloides

Rhamnus crenatus &

R. yoshinoi

Rhaphiolepis unbellata - in very exposed sites close to ocean, apparently salt and stress tolerant.

Rhododendron mucronulatum var. maritimum.

R. schlippenbachii and R. yedoense var. poukhanense - rare here and growing in stressed site only, c. 150 ft. from water's edge.

Rosa wichuraiana

Sageretia scandens

Sophora flavescens - except for S. japonica this genus is poorly known in cultivation; this shrubby species growing practically at edge of ocean. Sorbus alnifolia - important target species for shade tree evaluation.

Torreya nucifera - prize conifer.

Vaccinium oldhamii

Viburnum dilatatum and

V. erosum

Vitex rotundifolia - low decumbent shrub forming solid mats, growing practically at edge of water; with attractive blue flowers.

Weigela florida

Zanthoxylum planispinum

7. CHINDO ISLAND and vicinity. September 4-6 and October 14-17. The flora of Chindo Island, which lies circa 50 km. (as the crow flies) west of Wando Island in the extreme southern part of Korea, is poorly known with very few literature records or herbarium vouchers. It was suspected that Ilex x wandoensis might occur here. Indeed this was proven, but only one parent, I. integra, was documented from the wild. The fever for digging plants from the wild has ruined the natural habitats, and soon I. x wandoensis and numerous other species will be annihilated in the wild. Ilex cornuta, the other parent, was not documented from the wild, but there is very good reason to assume that it had been an indigeous plant. Fortunately, at the southern tip of Chindo there is a Buddhist Temple complex, Ssanggyesa, which guards a wonderful hilly expanse of fairly intact vegetation apparently inviolate from commercial exploration. An exploration, hopefully in the near future, should revisit Chindo with more time to explore more extensively.

SELECTED COLLECTIONS

Aphananthe aspera - a rarely seen but potentially important street tree.

Campsis grandiflora - fairly commonly cultivated on western and southern coasts; most assuredly an indigenous plant but extinct in the wild in South Korea.

Carpinus coreana and C. tschonoskii - both desirable species needing evaluation for landscape and street tree utility.

Castanopsis cuspidata var. sieboldii.

Celtis sinensis - clearly with superior street tree qualities.

Cephalotaxa coreana - rare in the wild and unknown in cultivation.

Cinnamomum japonicum

Cornus kousa

Eurya japonica

Euscaphis japonica - rare here.

Hedera rhombea

Ficus nipponica - low mat forming, decumbent or climbing evergreen shrub.

Ilex integra - in the wild and in cultivation documented as having been dug locally from the wild.

I. x wandoensis - rare in the wild and cultivated but documented as having been dug

in the wild locally; represents a new station in Korea for this endemic taxon.

Juniperus chinensis

Kadsura japonica

Lespedeza bicolor

Ligustrum quihouii var. latifolium.

Lindera erythrocarpa &

L. obtusiloba

Machilus thunbergii - few plants left in the wild, but cultivated with verification having been dug locally in the wild.

Neolitsea sericea

Pittosporum tobira

Quercus salicina - rare evergreen oak with striking glaucous-blue leaf undersurfaces.

Rhamnella franguloides

Raphiolepis umbellata

Rhododendrom mucronulatum

Torreya nuicifera - a National Monument, tree said to be over 200 years old.

Trachelospermum asiaticum

Ulmus parvifolia

Viburnum awabuki - extremely showy specimen plant in cultivation but verified as having been dug locally out of the wild.

Vaccinium bracteatum

Weigela praecox

8. SOSANGUN, TAEAN PENINSULA, CHOLLIPO ARBORETUM AND ANMYON ISLAND. September 6-9.

SELECTED COLLECTIONS

Berchemia racemosa var. magna - very rare endemic, high-climbing liana.

Campsis grandiflora - several cultivated sources; extremely large, flamboyant pastel orange/pinkish/apricot colored flowers.

Euonymus oxyphyllus

Ilex macropoda - near ocean at sea level; first time encountered in 1985 in Mountain sites of Naejang San.

Koelreuteria paniculata - native seaside plant collected from 2 populations, one designated as a National Monument.

Maackia amurensis

Machilus thunbergii -

cultivated at Chollipo Arboretum but originally dug from the wild on Taebangi Island, the northern most station of the species.

The above lists of Selected Collections of scientific voucher and germplasm materials from eight primary collection locales abundantly demonstrate that the objectives, goals and anticipations of Korea 1985 were not only met, but were greatly exceeded.

Among the many 1985 collections a number of species can be identified as being of high impact to research programs, such as taxonomic documentation, evaluation, selection, and hybridization for superior clones and populations with respect to hardiness, stress-tolerance and improved growth forms, floral size and color, foliage vigour, etc. I regard the taxa in the following list in this category.

SELECTED COLLECTIONS

<u>Actinodaphne lancifolia</u>	<u>Neolitsea sericea</u>
<u>Alangium platanifolium</u>	<u>Pittosporum tobira</u>
<u>Albizia coreana</u>	<u>Pyrus callyeriana</u> var. <u>faurei</u>
<u>Aphananthe aspera</u>	<u>Orixa japonica</u>
<u>Berchemia racemosa</u> var. <u>magna</u>	<u>Quercus acuta</u> , <u>Q. salicina</u> ,
<u>Buxus microphylla</u> var. <u>koreana</u>	<u>Q. serrata</u> and <u>Q. variabilis</u>
<u>Campsis grandiflora</u>	<u>Rhododendrom dahuricum</u> , <u>R.</u>
<u>Carpinus coreana</u> , <u>C. laxiflora</u>	<u>mucronulatum</u> , <u>R.</u>
& <u>C. tschonoskii</u>	<u>schlippenbachii</u> &
<u>Castanopsis cuspidata</u> var.	<u>R. yedoense</u>
<u>sieboldii</u>	<u>Rhamnella franguloides</u>
<u>Cephalotaxus coreana</u>	<u>Rhamnus koraiensis</u> &
<u>Cornus controversa</u> , <u>C. kousa</u> &	<u>R. yoshinoi</u>
<u>C. walterii</u>	<u>Rhaphiolepis umbellata</u>
<u>Daphniphyllum macropodum</u> &	<u>Sageretia scandens</u> &
<u>D. teijsmannii</u>	<u>S. theezans</u>
<u>Dendropanax trifidus</u>	<u>Sophora flavescens</u>
<u>Eurya emarginata</u>	<u>Sorbus alnifolia</u>
<u>Euscaphis japonica</u>	<u>Styrax japonica</u>
<u>Ficus nipponica</u>	<u>Torreya nucifera</u>
<u>Gardneria insularis</u>	<u>Vaccinium bracteatum</u> &
<u>Ilex cornuta</u> , <u>I. crenata</u> ,	<u>V. oldhamii</u>
<u>I. integra</u> , <u>I. macropoda</u> &	<u>Viburnum awabuki</u> ,
<u>I. x wandoensis</u>	<u>V. boninsimense</u> , <u>V. carlesii</u> ,
<u>Juniperus rigida</u>	<u>V. dilatatum</u> , <u>V. erosum</u> and <u>V.</u>
<u>Koelreuteria paniculata</u>	<u>sargentii</u>
<u>Lindera erythrocarpa</u> ,	<u>Vitex rotundifolia</u>
<u>L. glauca</u> & <u>L. obtusiloba</u>	<u>Zanthoxylum ailanthoides</u> ,
<u>Machilus thunbergii</u>	<u>Z. piperitum</u> , <u>Z. planispinum</u> &
<u>Meliosma myriantha</u> &	<u>Z. schinifolium</u>
<u>M. oldhamii</u>	

The experiences and collections in 1985 further re-enforce the position that the rich flora of Korea contains abundant elite plant materials, especially woody species, never before documented or introduced for research and landscape purposes. Accordingly, I urge that stages III, IV, and V be maintained and that the 5-stage plan be pursued vigorously. I would welcome the opportunity to participate on these stages for 6-8 week periods.

Regarding the 1986 scheduled stage III, Exploration of Cheju and Ullong Islands, I recommended in a 3 January 1986 to Dr. Cathey that it be postponed until 1987. This recommendation was accepted by all parties concerned at

a 3 January meeting. The wisdom of this was further re-enforced by a recent letter from a major supporter indicating cut-off date for 1986 grant funding had been July 1985. Accordingly, the cut-off date for 1987 funding from this source is July 1986. There is some question, however, about the sequence of the future stages of Korean exploration. In the 3 January memo there is the statement "and that the order of the three remaining stages of the five year plan is flexible." Some opinion has been that the northeast mountainous area scheduled for stage V should be switched with stage III. The decision of the locale for Stage III must be resolved quickly in order to prepare the proposal for a 1987 trip.

Both areas should be adequately explored: The Cheju and Ullong Islands trip will yield large quantities, particularly endemics, appropriate for the most part to the Mid-Atlantic and southeast states to Texas, California and the Pacific Northwest. Of course, residual Tertiary genetic hardiness potential is always an important factor. Plant materials from the northeast mountains will be applicable for USDA hardiness zones 4-8.

SUMMARY REPORT

Plant Exploration on the Southwest Coast and Islands,
Republic of Korea

July 31 to November 6, 1985

Prepared by Barry R. Yinger, Curator of Asian Collections, U.S. National
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March 4, 1986

The 1985 exploration of the southwestern coast and islands of the Republic of Korea, conducted by the U.S. National Arboretum, was organized under the auspices of the Friends of the National Arboretum, Inc. Substantial financial support was provided by North Carolina State University Botanical Garden, R.J. Reynolds Industries, Inc., and the University of British Columbia Botanical Garden. Additional support was provided by a grant from the Holly Society of America and several individual donors. This 1985 program successfully completes the second year goals of a systematic five-year program of plant exploration in the Republic of Korea, the first such effort to cover all parts of the country.

The previous year's program, directed to the northwest coast and islands (between about 36° to 38° N latitude, and 124°50' to 126°50' E) covered the area adjacent on the north to the 1985 program area, which extended from about 36°50' to 34° N latitude, and 125° to 127° E, excluding Cheju Island. The primary target areas for 1985 were these: the Pyonsan Peninsula and nearby sites, Naejang Mt., Mokpo, the Huksan Island group, Wando, and Chindo.

Each target area was visited at least twice; on the first visit the target area was surveyed to identify the best sites for seed collection in the autumn. This occasion was also used to document unusual and characteristic plants of each area with herbarium specimens. In addition, seed of those few species which ripen their seed in summer (such as Machilus) was collected. In the autumn the best sites were visited again for intensive collecting of large quantities of seed of the most desirable species, all documented with voucher herbarium specimens. Altogether, about 900 numbers of herbarium specimens and 320 numbers of germplasm collections were made.

The Pyonsan Peninsula

This mountainous peninsula extends west from the mainland into the Yellow Sea (from about 35°35' to 35°45' N, 126°28' to 126°40' E). It is of importance as a relatively undisturbed unglaciated mainland coastal site; as such it retains a rich flora which includes isolated relict populations of a number of more characteristically southern species. We were primarily interested in its status as the most northern modern point of distribution of Ilex cornuta and Ilex crenata, two hollies of great importance to the American nursery industry. Both of these species as now grown commercially are insufficiently hardy to be reliable features in the landscape of the northeastern United States. We were sorry to see that both species are now rare in the wild, apparently very near extinction in this part of their range. Fortunately many plants remain as cultivated specimens in gardens locally, having been moved to gardens from the wild within the past thirty years. Large collections of seed were gathered which should express a wide range of genotypes. This area is also the northern point at which wild trees of Machilus thunbergii still grow as fertile plants in the wild. Several seed collections of this very beautiful broadleaved evergreen tree were made; these promise to be significantly hardier than the material of Japanese origin which is now known in cultivation. Among the mountains in the interior of the peninsula is a site known as Yuyu Dong where several highly desirable species still grow in relative profusion. A very extensive population of Viburnum sargentii was located; the first I have seen in Korea. This material will be used in the USNA's Viburnum breeding program. Seed of a rare and highly desirable arborescent dogwood, Cornus walteri, was collected, as well as

Actinidia arguta with unusually large and very delicious fruit. A Korean endemic ginger, Asarum maculatum, was located and reported from the west coast of Korea for the first time. Other interesting plants were seen and collected along the coast, including a population of Ligustrum quihoui var. latifolium growing on a rock at seaside in the most difficult and highly-stressful site one can imagine, with excellent foliage in late summer. Malus baccata with clean superior foliage was collected. At the village of Hwapo slightly north of the peninsula we were pleased to find extensive colonies of Pyrus calleryana var. fauriei. Samples of this and several other collections have been sent to the fruit crops germplasm repository at Corvallis, Oregon.

Naejang Mountain

Naejang Mountain (ca. 35°28' N, 126°51' E) is a mountain on the mainland not far from the coast which is now part of a national park originally protected by the close proximity of Buddhist temples. Here is found the richest and best-protected forest remaining on the west coast of Korea. Our primary target was the most northern and highest-altitude population of the broadleaved evergreen tree Daphniphyllum macropodum, which grows here in profusion in deciduous oak-dominated forest at about 500 m. altitude. We were able to collect seeds from many very beautiful plants up to 10 m. tall. Of special interest were populations of a deciduous holly Ilex macropoda. The taxonomy of this species requires study, as does its value as a hardy ornamental tree. The largest specimens in Korea are here, some more than 15 m. tall, and thanks to the courage of our Korean assistants who could double as aerialists, we were successful in collecting seed. We were particularly impressed by the richness of the herbaceous flora, including at least three species of Lycoris, the Korean endemic Tricyrtis dilatata, and several fascinating orchids and Arisaemas. Extensive collections of another excellent arborescent dogwood, Cornus controversa, were made. Groves of ancient specimens of Torreya nucifera were dropping their fruits which are valued as an insecticide.

Mokpo

The city of Mokpo (ca. 34°46' N, 126°23' E) was visited both because it is the point of departure for boats visiting the islands off the southwest coast and because it is the site of Yudal Mountain. This mountain is most famous botanically as the only place in the world where Albizia coreana grows in the wild. We were sorry to find that the vegetation of the mountain, which is supposed to be protected, is very disturbed and in very poor condition. Albizia julibrissin has been introduced and is now interbreeding with A. coreana; it was very difficult to find genetically uncontaminated trees. It seems certain that before long Albizia coreana as a distinct species will be extinct in the wild. As this very distinctive tree is almost unknown in cultivation, there is special urgency to establish genetically pure populations in cultivation in the United States. Plants resulting from our collections from Yudal Mt. will be used in breeding and research programs at the USNA.

grazing goats. Treks to the top of Tokshil Mt. revealed that part of the mountain up to about 500 m. had been cut about 30 years ago to make charcoal to export, but this area had been allowed to return to normal forest. The area near the summit was nearly undisturbed, with rocky ledges covered by dense thickets of Buxux microphylla and Rhododendron dauricum rising above a mixed forest dominated by the evergreen oak Quercus acuta. The flowering tree Styrax japonica, which we know as a diminutive understory tree, grew to imposing size with its branches in the mature canopy. In a rather narrow zone in the foothills of the mountain we collected an evergreen Viburnum which appears to be Viburnum boninsimense, formerly known only from the Bonin Islands off the southeast coast of Japan, thousands of miles away. Near the summit of Tokshil is a species of Asarum clearly different than the two species now known from Korea, and perhaps a new species. One could expound endlessly on the wonders of this unknown island, and I believe that all those in the party were awe-struck by its unique resources. Unfortunately, the villagers seem determined to destroy these qualities as quickly as possible. In the few weeks intervening between our scouting and seed-collecting visits several ancient hollies were stripped of all their bark, and the cutting of the forest was clearly accelerating. This is a great tragedy for Korea and for science.

Wando

Wando (34°21' N, 126°41' E) is a large island now connected to the south coast of the mainland by a bridge and causeway. Until fairly recently the flora of this island was in good condition, but since my last visit there in 1980 almost all the interior forest has been cut to provide sites for the monoculture plantation of Cryptomeria and other exotic timber trees. Our primary reason for visiting here was to investigate hollies. Mr. C. Ferris Miller of Seoul had noted some years ago that both Ilex cornuta and I. integra grow together in the wild here where they produce populations of a previously unknown natural hybrid which he proposes to call Ilex x wandoensis. Dr. Dudley of our team was particularly keen to complete documentation of this very ornamental and variable plant in the wild so that its existence can be validly published. The desired documentation was completed, as were a series of seed collections mostly from plants which had been dug from the wild and planted in gardens and schoolyards. The hybrid and both of its parents are becoming very rare in the wild as they are dug and sold as ornamentals for use as bonsai as well as garden specimens. Ilex x wandoensis and one of its parents, I. cornuta will very soon be extinct in the wild on and near the south coast of Korea. Despite the generally disturbed condition of the vegetation we were able to collect in several sites which, for various reasons remain in more or less original condition. Most of these sites, such as the tiny island of Chudo just off the city of Wando, were family shrine sites where Shamanistic reverence for trees overcame more practical desires for firewood or construction material. In such sites were found fruiting plants of the extremely rare broadleaved evergreen climber Gardneria insularis, large trees of Ilex integra, and mature trees of the beautiful evergreen Actinodaphne lancifolia, an imposing tree with showy exfoliating bark resembling Platanus. One seaside site was the home of an extensive mature population of Koelreuteria paniculata, not previously reported from this part of Korea.

COLLECTING ELITE PLANTS
JAPAN - 1985

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Aritaki Arboretum, a private establishment near Tokyo, continues to be a valuable source for elite plants. The arboretum's curator, Tadahiko Aritaki, travels and collects extensively in Asia.

NURSERIES

In a brief summary such as this it is only possible to cover a few of the many nurseries visited. They ranged in size and scope from Mito Tenjiyama Branch Nursery, Mito City, a one man operation dealing in herbaceous plants in a backyard nursery, to Uchiyama Kyokuchi Kensetsu Corp., a nursery/landscape architecture complex near Kurume covering 700 hectares and employing 180 people.

While it is difficult for a foreigner to comment authoritatively concerning the nursery industry in Japan after a brief visit, it is possible to make some observations in trends observed as the result of 6 visits over the past 10 years.

There can be no question as to the increase in number and popularity of garden centers. They abound, are attractive, and stocked with a broad range of horticultural products including an interesting range of well grown plants, be it the garden center at Mitsukoshi department store in Tokyo; Shibamichi Garden Center, Kawaguchi; Sakata Garden Center in Yokohama; or the Yoshunen Nursery, Takarazuka City.

The future of three specialty nurseries I have known over the past 10 years appears to be in jeopardy. At the present rate of deterioration, I doubt they will be in business five years from now. While the complexities of life and business in Japan are not easy to understand, it appears that their lack of ability to "keep up", for whatever reason has let these nurseries fall into a state of disarray. In contrast, a new breed of specialty nurserymen are appearing on the scene; young, and aggressive with a keen sense for business opportunities on a world wide basis

Two large field nurseries that have been visited periodically over the past 10 years appear to be flourishing. The Shibamichi Nursery, Kawaguchi, has expanded its greenhouse facilities for the importation and testing of new woody ornamentals, along with the addition of a tissue culture laboratory. The Kage Nursery, near Kurume, continues its excellent field production of woody plants along with award winning pot cyclamen. Of special interest was Mr. Kage's extensive testing of various camellia cultivars for the most desirable understock for Camellia chrysantha.

PRIVATE COLLECTORS

Perhaps two of the best known plant specialists in Japan, particularly for variegated plants, are Dr. Masato Yokoi and Mr. Yoshinichi Hirose.

Dr. Yokoi's garden at Kawaguchi City can only be described as a paradise for those interested in variegated plants. Every square meter of the garden and greenhouse is jam packed with variegated plants. Because there is no space to walk, he waters the greenhouse by standing in the doorway and aiming the hose. Dr. Yokoi, Professor, Laboratory of Floriculture and Ornamental Horticulture at Chiba University, is an authority on plant pigmentation.

COMMERCIAL PLANT BREEDERS

T. Sakata & Company, Chigasaki, Kanagawa Prefecture is engaged in the breeding of vegetables and a broad range of garden flowers; petunia, snapdragon, coleus, pansy, chrysanthemum, ornamental cabbage and kale to name a few as well as pot plants; ranunculus, gerbera, cyclamen, gloxinia, and cut flower crops such as Lisianthus.

Fukukaen Nursery & Bulb Co. Ltd., Nagoya has to be one of the most progressive of the commercial plant breeders and marketers in Japan. The company is active in the breeding of a wide range of garden flowers, vegetables, cut flower, and pot plant crops. It is also a major importer and marketer of bulbs and plants from various parts of the world, with emphasis on plants from Africa and Australia. Many plants, including endangered species, are being propagated by tissue culture

ACCESSIONS WITH COMMERCIAL POTENTIAL

While it is premature to predict what impact the 292 accessions assembled will have on American horticulture it is perhaps appropriate to comment on a few of the accessions and their possible commercial application.

Aster tartaricus. For the perennial industry, a strong growing erect rhizomatous perennial to 6 feet, flowers blue-purple in October-November. Native to Japan, Korea, China and Siberia. This self-supporting aster with its apparent freedom of insect and disease problems and attractive fall flowering is a valuable addition to any garden. While not necessarily new to American horticulture, this plant is not well known or readily available. It is worthy of further evaluation, selection of superior forms and promotion. Observed as an outstanding garden plant at Jindai Botanic Garden, Tokyo and Kyoto Botanic Garden, Kyoto. Plants presented by Jindai.

Luculia gratissima. For the pot plant industry, an attractive subject with panicles of fragrant, pink flowers. In the wild, a tree or spreading shrub 2-3 meters. Native to temperate Himalaya. George McWilliam contributing to L.H. Bailey's The Standard Cyclopedia of Horticulture wrote "For house decoration, Luculia gratissima is one of the most beautiful winter flowering shrubs, and deserves to become more popular with florists for Christmas sales." Observed with the name "Assam" in garden centers where the Latin name was not known. Nepal was stated as the country of origin. Not a "new" plant, but one worth looking at again--perhaps as a Valentine plant with its beautiful, fragrant pink flowers. Plants purchased from Yoshunenn Nursery Co., Ltd., Takarazuka City.

Rhododendron mucronulatum - white flowered selections. For the nursery industry the potential for superior, pure white flowered selections of this important cold hardy (-20°F) early flowering azalea. While the white flowered form has been known and grown to some extent in Japan, it has remained an elusive plant in western horticulture. Accessions from this trip include plants of R. mucronulatum f. albiflorum purchased from Gotemba Nursery, Gotemba and wild collected seed from Tsushima Island, presented by Dr. T. Tamura, Tosu City. From contact with Prof. Pyung Sub Yoon, Shamyook University, Seoul, Korea we have also obtained a sizeable plant and seed of the white flowered form. With this germplasm and the R. mucronulatum

International Horticultural Conference and Exposition 1990. The Conference will be held in Kyoto at the huge bold new Kyoto International Conference Hall on the shore of Lake Takara-ike. The Exposition will be held at Expo '70 Commemoration Park, Osaka. Dr. Y. Tsukamoto, Professor Emeritus, Kyoto University and one of Japan's leading horticulturists is heading the planning commission. In meeting with Dr. Tsukamoto, he was anxious for National Arboretum participation. Word from a nurseryman dealing extensively with the Peoples Republic of China has indicated that the elusive conifer Catheyia argyrophylla will be exhibited.

ACKNOWLEDGEMENTS

The success of a major collecting trip involves the help of many people in the planning and execution of the trip. On behalf of Rick Darke and myself, I would like to thank the following people for their contributions:

Frank Cooper	PPQ Unit-APHIS
Walter Denny	Inspection House-APHIS
Norman Foran	USPIS-Glenn Dale
James D. Grueff & Staff	Agriculture, U.S., Embassy, Tokyo
Carl Hahn	Maryland National Capital Park and Planning Commission
Roger Lawson	Florist & Nursery Crops Lab, ARS
Alfred S. Martin	Alfred S. Martin Charitable Trust
Phil Normandy	Brookside Gardens
Elizabeth C. Rea	President, Friends of the U.S. National Arboretum
Frederick E. Roberts	Longwood Gardens
Mark Roh	Florist & Nursery Crops Lab, ARS
David Scheide	U.S. Botanic Garden
Marjorie Shorter	Inspection House-APHIS
Kathy Spitzer	Friends of the U.S. National Arboretum
George A. White	Plant Introduction Officer, ARS
U.S. National Arboretum Staff	

A very special thank you to our long time friend, Masaaki Kunishige, the major coordinator for the trip, and all the many old and new friends that made it such a memorable and successful experience.

the close proximity of reasonable, to very good restaurants enhanced our experiences of Korean life.

The expedition members quickly formed a very good-humored field-effective team which from my personal standpoint made the expedition such a rewarding experience. It is rare for five people to live in close proximity for nearly six weeks without any major interpersonal problems developing.

One criticism I must voice concerns the communication between the leader of the expedition and the other members of the expedition. On several occasions where a change in schedule became necessary the revised itinerary was not communicated effectively to the other members of the expedition, leading to misunderstanding and on one occasion bewilderment. Another tendency that I noted was the over-reliance of the expedition leader on the advice of the Korean technicians. In no way do I suggest that their valuable advice and experience be ignored, far from it, but there comes a point where an intelligent and calculated decision has to be made, otherwise confusion results.

I thought it might be useful for me to comment on areas we visited that would be worth further exploration in the future. One of the most impressive areas that certainly warrants further exploration is the Pyonsan Peninsula. We noticed the mountainsides above the village of Surak Dong were well wooded, especially in gullies between major rock bastions and along the sides of screes which had their point of origin below these bastions. A significant ridge walk also looked promising. Travelling into the main part of the peninsula to the village of Chong Gye the surrounding mountainsides appeared, through field glasses, to be comparatively undisturbed, due to the rugged terrain. An expedition based in this area and capable of penetrating up into these thick forested areas would, I think, make significant discoveries. A further area of outstanding potential that we drove by on our way from Chindo to Chonju was the Wolchul Mountains. A large, rocky massif covered in part by scrub and some forest in the gullies, though rock outcroppings predominating.

The Korean Exploration Program of the U.S. National Arboretum is a first-class example of effective wild germplasm collection and I was privileged to have been able to participate in such a thoroughly professional venture.

A Peter W. Ashton

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e. Melvin N. Westwood, National Technical Advisor for Clonal.....	
Germplasm.....	
f. Dan E. Parfitt, National Clonal Repository.....	
g. Ronald L. Perry, Michigan State University.....	
h. W. R. Okie, Southeastern Fruit and Tree Nut Research.....	
i. Tetsuo Koyama, The New York Botanic Garden.....	
j. Taro Fujii, National Institute of Genetics, Misima, Japan.....	
k. Robert F. Lederer, American Association of Nurserymen, Inc....	
l. Betty Rea, Friends of the National Arboretum.....	
m. Thomas J. Delendick, Brooklyn Botanic Garden.....	
n. Harold Pellett, Ornamentals CAC.....	

nipponica var. kurilensis, for dwarf growth habit, hardiness, and autumn foliage coloration; P. subhirtella 'Autumnalis' and P. (Sato-zakura group) 'Fudan-zakura' with autumn flowering and P. maackii with disease resistance, hardiness, trunk bark coloration; and P. leveilleana for disease resistance, foliage, and autumn color, are examples of potential directions for genetic research. However, the fulfillment of this goal can only be achieved by the acquisition of provenance species collections from diverse habitats within the geographic range. Until 1982-1983, when Prunus species were collected in Japan, there had been no systematic effort made to procure quantities of seed from Asia for provenance testing. Currently the National Clonal Germplasm Repository, Davis, California, has no native collections of Asiatic Prunus species.

Although the flowering cherries are highly esteemed in the U.S. for the profusion of early spring bloom, the potential for nursery production and landscape use has not been realized. Relatively few cherry cultivars are grown by many nurseries, while those few nurseries that do propagate a wider range of species and cultivars are confronted by obstacles of disease; stress tolerance limitations; relatively short tree life; inferior germplasm selections; and restricted diversity of growth habit, flowering and horticultural characteristics. Among the existent genetic species diversity, there is unlimited potential for the introduction of authentic germplasm that will allow future development of stress tolerant cultivars adaptable for greater northern and southern geographic distribution. Nursery production and landscape planting will also be promoted by a plant with a multiseasonal appeal with flowers in the spring, as well as in the autumn or during early winter warm periods; glossy, disease and stress tolerant leaves in summer; intense autumn coloration; spectacular bark color and texture throughout all seasons; and compact low growing trees, stately specimens, or street tree growth habits. From provenance evaluation of native collections noteworthy selections of the important landscape species can be made for direct introduction into the nursery trade. Further hybridization will yield an array of cultivars with specific adaptability to nursery production in all significant nursery production areas of the U.S. With the release of elite cultivars and subsequent mass nursery production, flowering cherries can become one of the important landscape tree with many cities sharing in the "Cherry Capital" festival.

The appended proposal to collect Prunus species in Northern Japan especially P. sargentii and P. nipponica var. kurilensis for hardiness; Taiwan for P. cerasoides var. campanulata the darkest-colored flowered species, Ullung Island, Korea P. takesimensis a dwarf with exceptional landscape merit and Korea the center of origin and endemic habitat of several species, will further contribute to the germplasm basis for genetic research which heretofore has not been available. Provenance evaluation of collections from different sites within the species range will enable critical taxonomic studies, stress tolerance appraisal, isolate potential selections for introduction, and provide select germplasm for hybridization. From Northern Japan can be procured cold hardy collections; from Taiwan, collections from semi-subtropical regions at the higher elevations suitable for more southern culture; and from Korea, water and salt tolerant collections as well as a range of horticulturally superior collections. Even though the National Arboretum emphasis is on the landscape merits and nursery potential, this germplasm is also significant for the commercial sweet and sour cherry



maximowiczii Rupr.
nipponica Matsum.
nipponica var. kurilensis Wils.
sargentii Rehd.
ssiori fr. Schm.
verecunda (Koidz.) Koehne
yedoensis Matsum.

Nikko, Japan

Prunus

nipponica Matsum.
nipponica var. kurilensis Wils.
sargentii Rehd.

b. Specific or General Characteristics Sought:

To introduce through seeds collected from Taiwan; Cheju and Ullung Islands, Korea; and Hokkaido and Nikko area Japan, superior disease resistant, stress tolerant flowering cherry selections that potentially could be used to extend the northern and southern limits in the United States where these plants can now be successfully grown. Further, to introduce seeds from wild cherry taxa reported growing along watercourses whose progeny could be a source of water- and or salt-tolerant rootstocks. These seed will be collected mainly from trees and shrubs growing under diverse conditions in the frigid and semi-subtropical climates of the above countries.

c. Use to Be Made of Germplasm Collected:

Prunus taxa collected in Taiwan; Cheju and Ullung Islands, Korea; and Hokkaido and Nikko area, Japan, will:

- (1) Provide Prunus germplasm for the National Arboretum provenance evaluation and genetic research programs. The plants will be evaluated for growth rate and habit, pest and disease resistance, heat and cold endurance, environmental tolerance and a range of ornamental characteristics under severe natural and/or induced stresses.
- (2) Secure Prunus taxa from known geographic origins for provenance inclusion in the National Clonal Germplasm Repository, Davis, California, that subsequently will make germplasm distribution to Prunus breeders, other researchers and institutions.
- (3) Yield provenance germplasm selections for genetic studies and the production of progeny with greater stress tolerant and ornamental adaptability. Superior selections will be propagated and distributed for further regional testing prior to introduction, and distribution to nurserymen.
- (4) Obtain provenance collections from lowland latitudes along water courses and wet areas that will be appraised as potential water and salt tolerant root stocks.
- (5) Isolate Prunus germplasm from the most northern limits for hardiness and a range of semi-subtropical localities that could be successfully grown in more northern and southern climates of the United States.

work. He has been compiling a world-wide directory of flowering cherries and has contacted 242 scientific and horticultural institutions in this survey. He is, at present, attempting to correct and clarify the confused taxonomic nomenclature of the flowering cherries. In the most recent publication -- Jefferson, Roland M., and Kay Kazue Wain. 1984. The nomenclature of cultivated Japanese flowering cherries (Prunus): the Sato-Zakura group, U.S. Department of Agriculture, National Arboretum Contribution No. 5, 44 pp. -- existing Japanese flowering cherry names are taxonomically resolved.

His international reputation was recognized in 1980 when he became the key figure in a new Japanese-American cooperative effort on flowering cherries. In January 1981, a team of representatives from the Tokyo metropolitan Government visited Washington, D.C. and, with Mr. Jefferson's help, collected more than 2000 budsticks from Japanese cherries to be brought back to Japan. More than 10,000 plants were growing in Japan for planting in 1982 in observance of the 50th anniversary of Adachi-Ku, the area of Tokyo from which many of the original Washington trees had come. As a result of his personal involvement and expertise, Mr. Jefferson was invited to visit Japan from April 4, 1981, to May 11, 1981. His expenses were paid by the government of Adachi-Ku and his travels were arranged by the Flower Foundation of Japan. He traveled and lectured widely, observing cherry trees and documenting them by collecting herbarium specimens. He visited scientists in many areas, making arrangements for the later collection of seeds from selected trees. This visit laid the groundwork for a two-phase Japanese flowering cherry collection expedition.

The purpose of the two-phase Japanese flowering cherry Japan expedition was to introduce, through seeds and budwood, superior ornamental cherry selections into the United States. This material was collected from native and cultivated trees and shrubs growing in areas of climatic diversity from Kyushu through Hokkaido with special emphasis placed on collecting from disease-resistant plants that showed potential for ornamental acceptance. The first of the two-phase Japan cherry expedition began on March 9, 1982, and ended on August 5, 1982. During the time cherries bloomed in Japan, wild and cultivated cherry sites were visited to evaluate plants and arrange for later collecting seed and budwood. As the result of these visits, approximately one million seeds were collected from various wild and cultivated cherry selections growing in various locations in central Japan. Between November 11, 1982, and February 9, 1983, the second phase of the Japan flowering cherry expedition was conducted. During this phase, budwood was collected from 174 pre-selected ornamental cherry taxa growing in some of the major cherry collections on the islands on Honshu and Hokkaido.

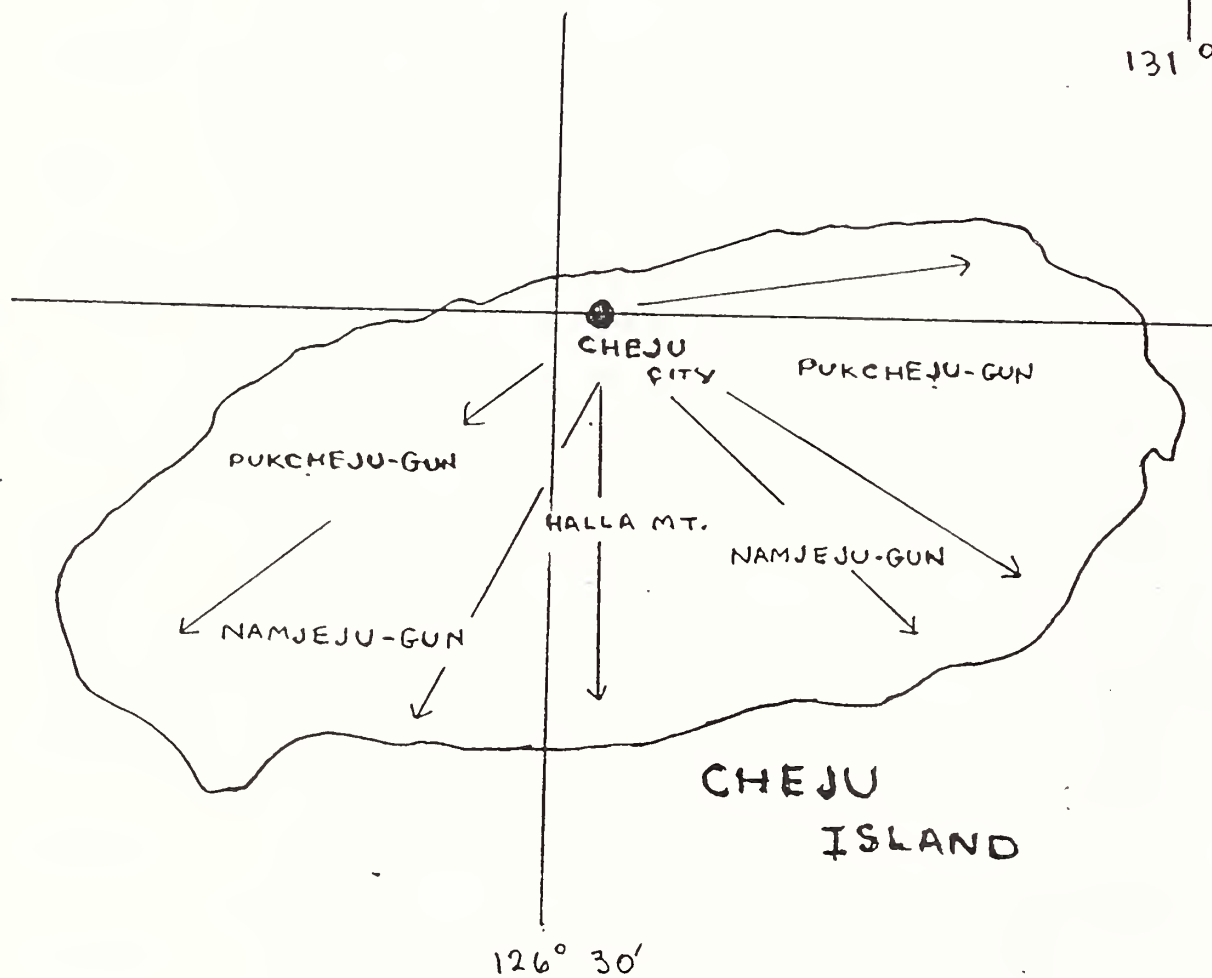
Roland M. Jefferson was born September 3, 1923, in Washington, D.C. He received a B.S. in Botany from Howard University in 1950 and completed 22 quarter hours of post-graduate Botany studies. Since 1956, he has been employed by the U. S. National Arboretum and currently is a Botanist GS-12. In addition, he has been an instructor of Plant Materials for the Continuing Education Center, George Washington University, Washington, D.C., from 1974 to the present time; and Instructor, Plant Materials, USDA Graduate School, Washington, D.C., from 1979 to the present time.

His official government passport number is Y1897891 and his personal passport number is 10827121 Exp. Sept. 87

37° 35' 131°

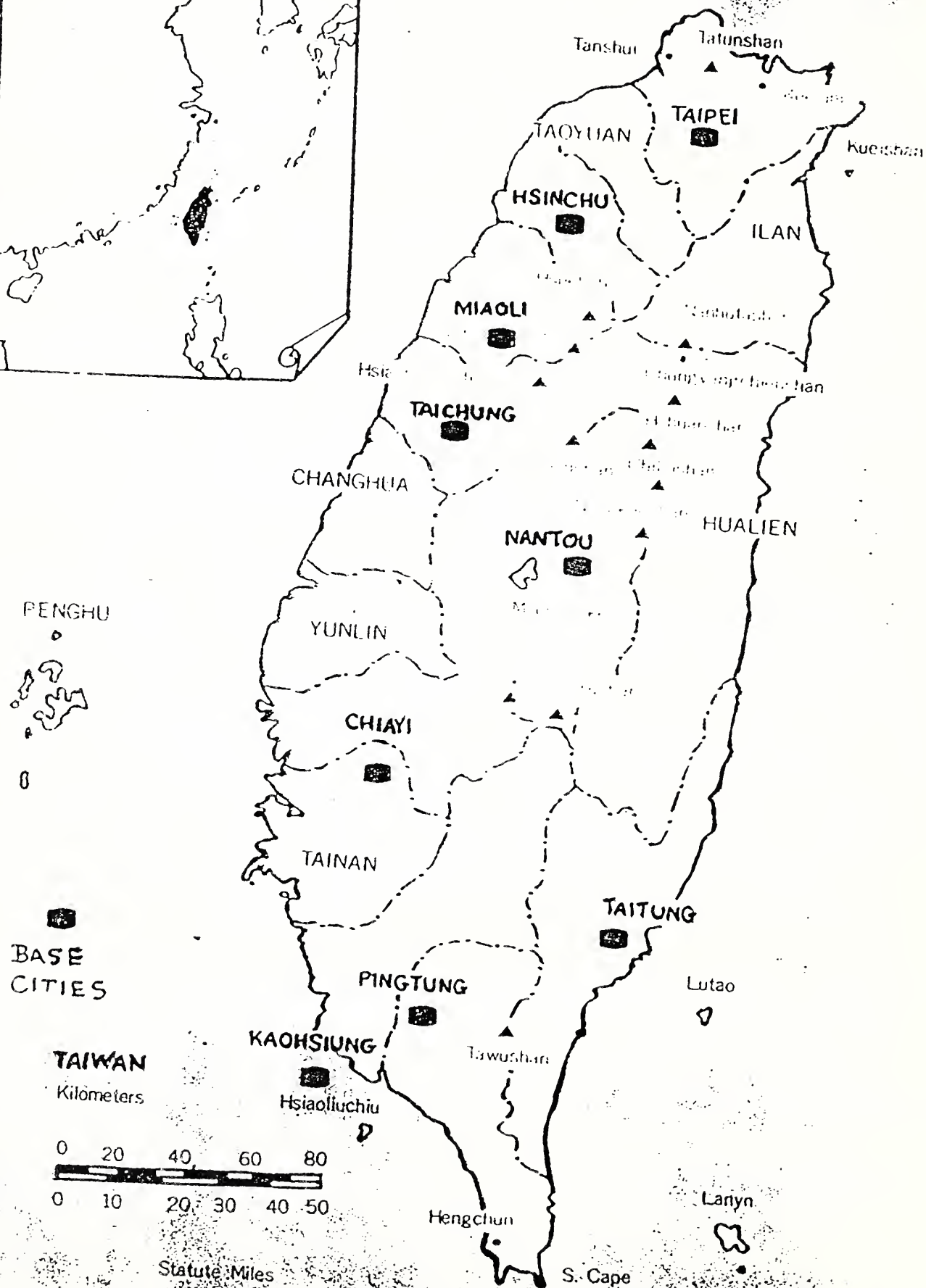
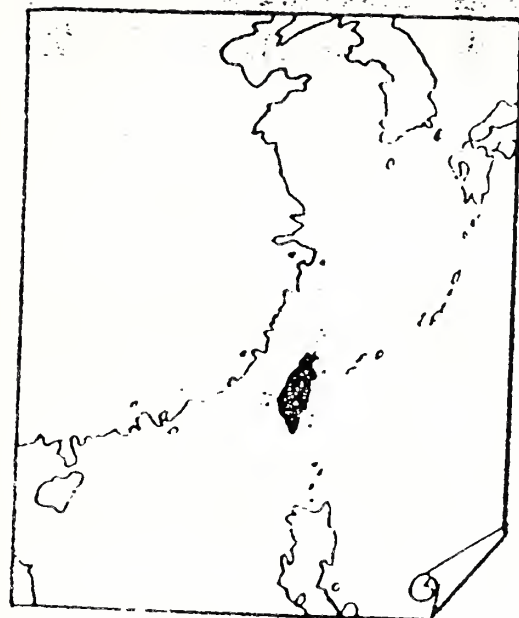


131° 55'



SCALE 1: 500,000

0 10 20 KM



Nikko 36.45N 139.37E

Town, Tochigi prefecture, Central Honshu, Japan, 20 miles northwest of Utsunomiya, in Nikko National Park. Nikko National Park is in a mountainous area with cryptomeria forests and several waterfalls. Nyoho san, Nakimushto-yama and Nantai-san are mountain locations near Nikko.

Japan (Hokkaido and Nikko)Map Location

Abashiri	44.02N 144.17E City, E. Hokkaido, Japan, port on Abashiri Bay, 95 mi. ENE of Asahigawa. Port frequently ice bound in winter.
Asahigawa	43.46N 142.23E City, W. Central Hokkaido, Japan, on Ishikari R. and 70 mi. NE of Sapporo.
Bibai	43.21 141.53E W. Central Hokkaido, Japan 32 mi. NE Sapporo.
Chuzenji, Lake	36.45 139.37E Central Honshu, Japan in Nikko National Park surrounded by hills with cherry trees. 6 mi. W. of Nikko.
Esashi	41.54N 140.09E Town, SW Hokkaido, Japan on sea of Japan, 32 mi. WNW of Hakodate.
Hakodate	41.46N 140.44E City SW Hokkaido, Japan on small peninsula in Tsugaru Strait, 70 mi. N of Aomori (on Honshu).
Jakko Waterfall	Nikko
Kami-shihoro	43.13N 143.16E Hokkaido
Kitadake	Highest point on Shirane-san (See)
Kuro dake	Hokkaido
Kushiro	City, SE Hokkaido, Japan, port on the Pacific 110 mi. SE of Asahigawa.
Maruyama	Since early 1940 a part of Sapporo, Hokkaido

Wakanaï

45.26N 141.43E

Town, extreme N. Hokkaido, Japan, on Soya Bay (inlet of La Perouse Strait), 120 mi. NNW of Asahigawa.

Uran Waterfall

Near Nikko

Prunus (Cherries) Taxa and Collecting Locations
TAIWAN

Prunus campanulata Maxim. (Cherry)

Taiwan, in broad-leaved forests at 500 - 2000 m. throughout the Island. Southern China. The Ryukyus, Japan

Taiwan, in forests at 300 - 2000 m. in the northern and central parts of the island. Mt. Alishan; Taichung; Nantou; Mt. Taipingshan; Hsinchu; Taipei.

Prunus grisea (C. Muell.) Kalkm. (Bird Cherry)

Taiwan, known from Is. Lanyu (Butel Tobago) only. Taitung; The Philippines.

Prunus phaeosticta (Hance) Maxim. (Cherry)

Taiwan, very common in thickets at 500 - 1500 m. throughout Island. Taipei; Miaoli; Nantou; Haulien.

Taiwan, common in thickets, at medium altitudes throughout the island, Hengchun; Nantou; Miaoli; Sun-Moon Lane; Tawushan. Assam through southern China.

Prunus pogonostyla Maxim. (Cherry)

Taiwan, in primary forests at medium altitudes. Southern China.

Prunus natunai Sasaki Endemic

Known only from the type locality, Taipingshan, Endemic. At ca. 2000 m.

Prunus taiwaniana Hayata (Cherry) Endemic

In the central part of Taiwan only. Endemic. Nantou.

Prunus takigawamontana Sasaki (Cherry) Endemic

Known from the original collection from Mt. Lala Taiwan only.

Prunus vaniotii H. Lévêillé (Bird Cherry)

Known from the vicinity of Mt. Alishan Taiwan Only. Chiayi: Mt. Alishan to Lulinsan.

Korea (Cheju and Ullung Islands.)Prunus buergeri Miq.

Hab. Cheju Is. Distr. Honshu, Shikoku et Kiushu.

Prunus densifolia Koehne

Hab. Cheju Is. Forest. Endemic Plant

Prunus itosakura, Sieb. ascendens, Makino (P. subhirtella Miq.)

Hab. Forest Cheju Island and Peninsula southern Korea Distr. China, Kiushu, Shikoku and Japan.

Japan (Hokkaido and Nikko)

Prunus apetala (Sieb. et. Zucc.) Franch et. Sav.

This cherry is fairly common in thickets along streams of low mountains on Pacific side of central Honshu, but very rare in western Japan. On the Japan sea side of central Honshu and in northern Honshu, a variety, var pilosa (Koidz). Wils. in found. Flowers appear in April to May before the unfolding of leaves. Drupes maturing from red to blackish-purple in July to August.

Low mountains: Honshu, Kyushu. Flowers - April. Japanese names Chojizakura, Mejirozakura, Taninozoki.

Honshu: Shimotsuke, Nikko; Nikko, near Urami waterfall; Nikko, near Nakimushi - Yama; Chuzensji, Nikko.

This species is fairly common in thickets and margins of woods through central Hondo (Honshu) up to 1000 m. Altitude and as far north as the Nikko region.

Prunus grayana Maxim. Endemic

Common on low mountains from southern Hokkaido through Honshu and Shikoku to Kyushu. Endemic to Japan, it occurs in sunny moist locations in cool - temperature areas. Flowers in April. Drupe ripening in August.

Hills and mountains; Hokkaido, Honshu, Shikoku, Kyushu. Flowers April - June. Japanese name Ulua-mizuzakura.

Prunus maximowiczii Rubr.

Mountains; Hokkaido, Kyushu, Sakhalin, Korea, Manchuria, and Ussuri. Flowers June. Japanese name: Miyamazakura

Honshu : Fuji-san 1000 m., Nikko Jakko waterfall 800 m. Hokkaido: Onuma Mts. near Sapporo. This very distinct species is common in thickets and forests from central Honshu northward to Sakhalin.

Prunus nipponica Matsum.

Common in the Alpine and Subalpine zones of central and northern Japan. Flowers in May to July. Drupes maturing black in July to August.

High mountains, Hokkaido, Honshu (central and northern district). Flowers May-July. Japanese names Mine-zakura, Takanezakura.

Honshu: Shinano, Ontake, Mt. Norikura, Yatsuga-dake; (Nikko: Sanjo-no-yama, Nyohosan, Yumoto, Nantai-san). Hokkaido: Esashi, Shiribeshi-san, Sapporo-dake; Abashiri. Common in northern Japan on mountains above 2500 m. around Lake Yumoto, Nikko region it forms a neat bush tree, often 6 m. tall.

Hokkaido: Yokotsu-dake very cold windy location, Matsumae cultivated in large Japanese cherry collection.

Prunus nipponica var. kurilensis (Miyabe) Wils.

Hokkaido, Honshu (central and northern district), Kuriles and Sakhalin. Flowers: no date given Japanese name. Chishima-zakura

Sapporo, Hokkaido, cultivated in Botanical Garden (plants brought from Iturup Island, Kurile Islands).

8. Germplasm Currently Available:

The National Arboretum plant exploration trips to Japan in 1982 and 1983 have produced plants for the Prunus research program which will not duplicate collections of the 1986 exploration with the exception of P. sargentii and P. mume var kanlinensis. From the previous trips only limited provenances of these species were sampled and too few plants produced to adequately appraise the genetic diversity. As these are two of the most important species for research, they are target species for extensive provenance collection during the 1986 exploration. This will be the first concentrated Prunus collection for these species. The emphasis will be on extensive provenance sampling of wild population, especially in the extreme geographic localities.

9. How Does the Exploration Relate to Earlier Explorations or Subsequent Expeditions:

The 1986 exploration of Taiwan; Cheju and Ullung Island, Korea; and Hokkaido and Nikko area, Japan is the second phase of the proposed National Arboretum comprehensive Asiatic Prunus species collection. The first collection phase involved primarily the wild species populations of central Japan and the horticultural collections of cultivars. Further explorations in 1987 is anticipated into southern Japan including Okinawa and other areas of Korea. If and when conditions are favorable to procure as many collections as feasible from mainland China.

10. CAC or other Concurrence:

The details of the Prunus collection trip to Taiwan, Korea, and Japan have been reviewed with the National Arboretum staff; Dr. Dan Parfitt, National Clonal Germplasm Repository, Davis, California; Dr. Melvin N. Westwood, Northwest Plant Germplasm Repository, Corvallis, Oregon; Dr. Robert Lederer, American Association of Nurserymen, Washington, D.C.; Dr. David Ramming, U. S. D.C. Fruit Laboratory, Fresno, California; Dr. Ronald L. Perry, Michigan State University, East Lansing, Michigan; and will be reviewed by other specialist before submission of proposal. All contacts to date concur as to the merits of concerted effort to procure the Asiatic Prunus species. Prunus exploration is mandatory for pursuit of the National Prunus research program of the National Arboretum.

11. Status of Mapping and Map Requirements:

All necessary maps are on order from the Defense Mapping Agency.

12. Vehicle and Fuel Requirements, Availability, and Cost:

A regular van or full size automobile, with 2-wheel drive, will be adequate to carry supplies and persons between base and target sites. Vehicles will be obtained from Rental Agencies in each country. Estimated cost (Hertz International) per country: Japan \$2700; South Korea \$1400; Taiwan \$2000. Estimated gas cost is \$1000 and gasoline is available at all base sites.

13. Currency/Exchange Rates: (On August 4, 1985)

Japan \$1=239 Yen; South Korea \$1=881 Won; Taiwan \$1=37.95 NT\$

16. Field Plan:

After arrival in the field areas, a reconnaissance will be made to establish plant population locations and to document, through photographs and specimens, various cherry selections for later germplasm collections. Travel between base cities in all countries will be by car or rail, and by car or foot to all cherry target areas. Trips to base cities or target areas in any country can be completed in one day. Adequate food and lodging will be available at each base city. Travel arrangements to and around Ullung Island, Korea will be made by the United State Counselor, American Embassy, Seoul, Korea.

Subsequent Expositions:

The 1986 expedition of the Japanese Government to the island of Japan is the most comprehensive and the first to have been carried out since the war. It was primarily for the purpose of collecting botanical specimens and for the purpose of studying the natural conditions of the island and when conditions are favorable for the collection of botanical specimens.

Other Computer Notes

The results of the Planning
reviewed with the National
Geographic Society, Cor.
Association of Universities,
Laboratory, Fresno, California;
East Lansing, Michigan; and
substantiation of proposal.
requested effort to provide
membership for benefit of
National Geographic Society.

rajn. ser. genl. no. 1799. 10. 10. 1932.

all necessary steps are on . . . from the Defense

12. Where and How the Fuel Required is Available

Estimated cost is \$1000 and gasoline is available at 10¢ per gallon. Estimated cost is \$3000 and gasoline is available at 10¢ per gallon. Estimated cost is \$3000 and gasoline is available at 10¢ per gallon.

Continuity of Expenditures Rates: (On 1 July 1985)

[illegible]

Seoul, Korea
(arrange for travel and seed collecting assistance)

Kim Un Cho, President

Korean Horticulture Society

P.O. Box 1763

Seoul, Korea

Korean Forestry Society

and Korean Plant Protection Society

both at:

Seoul Nongkwa Taehak

Sodun-Dong

Suwon-Si, Korea

Advisors

(arrange for travel and seed collecting assistance)

(3) Japan

Dr. Taro Fujii, Geneticist

National Institute of Genetics

Mishimi, Japan

(arrange for travel and seed collecting assistance)

Yoshiyuki Takishima, Director of Research

The Flower Association of Japan

Komatsu Building 8 F

2-3-8 Akasaka

Minato-Ku, Tokyo 107 Japan

(assist in locating taxa and collecting seeds in each country)

All foreign participant speak English

Upon request, host country assistance, as needed, will be provided by the following U.S.D.A. Foreign Agricultural Service Counselors.

(1) Taiwan

John T. Hopkins

American Institute in Taiwan

Taipei, Taiwan

(2) Korea

Daniel B. Cona

American Embassy

Seoul, Korea

(3) Japan

Edwin A. Bauer

American Embassy

Tokyo, Japan

22. Itinerary:Japan (Hokkaido and Hokkaido)

Hokkaido, the northern most Japanese Islands, extends 260 miles north and south, and 280 miles east and west. It has 2 major airports near the capital city of Sapporo and the city of Obihiro. There are railroads and highways connecting the 28 major cities that will serve as base sites for documentation and collecting trips to other areas. Cherry documentation or germplasm collecting trips will be made between April 11 - May 19 and July 12 - August 15. The day and time of travel during these dates will depend upon time of bloom and seeds maturing. The approximate distance in miles between base cities are:

Sapporo---90---Hokkaido; Sapporo---45---
Bibai---140---Wakkanai---60---Esashi---
130---Abashira---70---Nemuro---150
---Obihiro---120---Asahikawa.

Nikko

The town of Nikko is situated in a range that takes 2 hours to reach by train from Tokyo. Its location provides easy access to Nyobo-san, Nakimusho-yama and Nantai-san mountainous areas that potentially could provide valuable cherry germplasm: Travel time to document Prunus taxa, and later to collect germplasm, will be from April 5 - 10 and July 7 - 11. The day and location of travel will be determined by time of bloom and maturing of seeds.

Korea (Cheju and Ullung Islands, Korea)

Cheju Islands Korea is 45 mi. long and 18 mi. wide. It has many acceptable hotels and any location on the island is easily accessible by railroad and highway from Cheju. A modern airport is located near Cheju.

Ullung Island, Korea a roughly circular island is 6 mi. in diameter. Being 140 mi. from the east coast of the Mainland without an airport, it is accessible only by boat. Travel arrangement to and around this location will be made through Daniel B. Conable, Counselor, American Embassy, Seoul, Korea.

Cherry documentation or germplasm collection trips to Cheju and Ullung Islands will be made between March 20 - April 4 (Cheju Island 10 days; Ullung Island 6 days - 2 in travel) and June 16 - July 6 (Cheju Island 15 days; Ullung Island 6 days - 2 in travel). The day and time of travel during these dates will depend upon flowering time and when the seeds mature. Cheju will be the work base for Cheju Island, and documentation and seed collecting trips will originate from this point. Details for collecting on Ullung Island will be completed later by U.S. Embassy officials.

Taiwan

Taiwan is an island that extends 235 mi. north and south; and 90 mi. east and west. There is an international airport at Taipei its capital city, and there are railroads and modern highways between the 9 major cities that will serve as base sites from where cherry documentation and seed collection trips will be made. Acceptable hotels are at all of the base cities and trips from each city can be

'A Garden Should Be As Lively As a Circus'

Photos by John Neubauer

Dr. Marc Cathey, part pitchman, part scientist, has turned the 444-acre National Art turn into a must-see for Washington visitors

CITY

WASHINGTON TIMES
May 1, 1986

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In Living Color*



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By Rev. J. C. ...

By Xiang
 Wang
 2010

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Blossoms
Apotheosis
Apotheosis

For them to have
the foreign
middle of Washington
-reorderful.

By Kristina Mestfield
on 11/01/2011

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